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THE IRON TRADE REVIEW

VOLUME XXXII. CLEVELAND, O. JANUARY 12, 1899. CHICAGO, ILL. NUMBER 2

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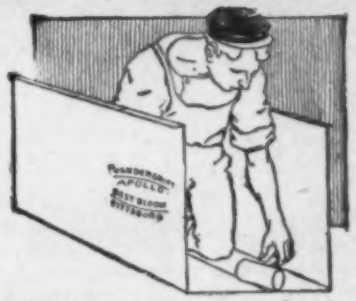

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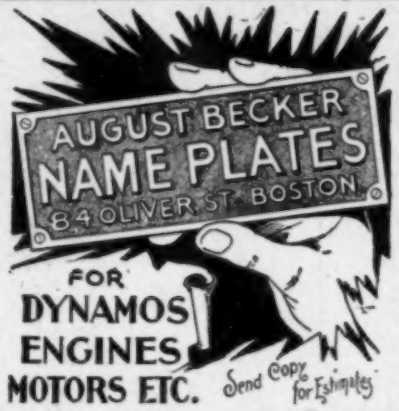

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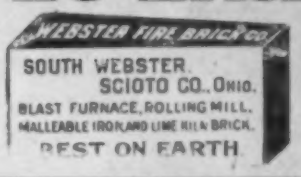

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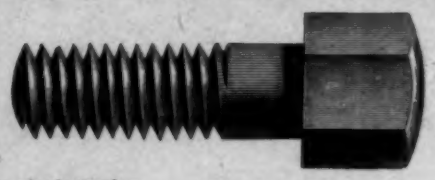

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THE IRON TRADE REVIEW

VOLUME XXXII. CLEVELAND, O. JANUARY 12, 1899. CHICAGO, ILL. NUMBER 2

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

All the strength in prices that has been accumulating in the iron trade since early December has been held in the past week and in some lines further advances have been made. Some tension is apparent, but the influence of the leading producers is being exerted to keep things under control. There is some further increase in pig iron production, the tendency everywhere to push furnaces to the utmost, with the reinforcement of recent improvements, showing itself in larger outputs, even with little change in the number of furnaces active. News of the combinations has been an engrossing feature in the past week, foremost in this category being the official announcement that the American Steel & Wire Co. programme for the practical control of the rod, wire and wire nail production of the country lacks only some transfer formalities to become a fact. The $90,000,000 capitalization goes even beyond the basis that was considered excessive by the underwriters of the scheme of one year ago. Wire and nails have advanced about $4 a ton to the general trade, over the prices of the middle of December. The American Tin Plate Co. has announced prices on the basis of $3.10 a box at mill to the carload buyer. The basis talked of earlier was $2.85 or $2.90, but in view of the advance in pig tin, which is now 21¾ cents at New York, the announced basis is relatively no higher. It is evident that the new organization does not propose to recognize the tin plate broker as a factor in the trade. It is reported that one bar mill is to be acquired by the new company, and that arrangements have been made with two others for their output of bars. The situation in steel has developed increased firmness the past week. Temporarily production has been shortened through the enforced idleness of several Central Western mills, and there is a scarcity of prompt billets and sheet bars, with a prospect that the stringency may be prolonged for some time. The Pittsburg quotation is $16.75, Pittsburg maker's mill, and $16.50 and $16.75 represents the range of quotation for the next three or four months. Nothing has been done in Bessemer pig iron, but $10.50 in the valley is the furnacemen's price. Present steel consumption indicates further purchases of iron in the near future. All finished materials are strong. Plates continue to attract attention for the engorged condition of the leading mills, some of which will be unable to talk to buyers for weeks to come. In the Chicago district a 3,000 ton order is included in the past week's business. An important purchase noted elsewhere further concentrates plate production at Pittsburg and points to a rapid extension of the export trade in plates from that center, in the coming year. Chicago reports large contracts in bars and an advance which though long in coming is now general, and amounts to $2 a ton over November. The agricultural implement trade has been a heavy buyer lately, and railroads and car works have kept up their pace. Structural mills have unusual orders booked for the first week of the year, and the advanced prices are being readily paid. Reports from the vessel yards of the country indicate an enormous tonnage for the coming year, and the demand from this source upon steel mills will be well sustained. In the East some negotiations are pending that will mean large additions to the export trade in steel in the year. The Virginia furnace movement is making progress, and several plants are reported optioned to the syndicate. Alabama furnaces have declined not a little business since the year opened, but are finding some satifsaction in the lessening of inquiry. The export trade of the year is an unknown factor, but it is appreciated that the price on foreign shipments from the South must be held close to the present level. Concessions on Southern freights are being withdrawn, so that delivered prices are somewhat higher in Central and Western territory. The week's developments in Cleveland vessel charters on Lake Superior ore would indicate that no stimulus to a boom in prices for 1899 is to come from the vesel interest, at least.

PITTSBURG.

OFFICE OF *The Iron Trade Review and Industrial World.*
705 PUBLICATION BUILDING, Jan 11.

The situation in some portions of the iron and steel market has become more feverish. There is a lack of conservatism on the part of many which may lead to reactionary results. Efforts are being made by the more conservative element to prevent prices of raw material from advancing any further. It is rightly felt that for the lasting good of the trade the present level in most lines is high enough. On Saturday the American Steel & Wire Co. completed the last of the deals by which it comes into absolute control of the situation, by purchasing, in addition to the rod, wire and nail mills of the Oliver Wire Co., the steel plant and Edith Furnace of the Oliver & Snyder Steel Co. The event was signalized on Monday by an advance of 10 cents a keg on wire nails. For the past month or so the price has been $1.40, Pittsburg mill, in carload lots. Before that it was considerably lower. The new price is $1.50 in carloads, with the usual advance of 5 cents for less than carloads. To more closely restrict the field of the dealers, the minimum carload has been advanced to 300 kegs, or 15 tons, and on shipments made for dealers direct from mill an advance of 2½ cents over the $1.50 is now charged. A further advance is expected at any time. The Edith Furnace which goes with the Oliver & Snyder Co.'s steel works (formerly operated by the Hainsworth Steel Co.), is practically a new furnace, the old Edith stack being used as a dust catcher.

PIG IRON.—No more valley iron is to be secured under $10.50, and the furnaces are not desirous of selling further, although $10.50 is still quoted. At Pittsburg the price is from $11 to $11.15. Operations have been light. In forge and foundry irons the situation is quieter. We quote:

Bessemer, valley furnace	$10.50
Bessemer, Pittsburg	11.00 to 11.15
No. 1 Foundry	11.10 to 11.30
No. 2 Foundry	10.50 to 10.60
No. 3 Foundry	10.00 to 10.10
Gray Forge, valley furnace	9.50
Gray Forge, Pittsburg	9.75 to 9.85

BILLETS AND RODS.—The situation is one of considerable tension. With the unremitting pressure on steel works for deliveries on specifications, the least cessation of production is keenly felt. The leading Wheeling interest is temporarily inactive; the Ohio interest has been idle since the first of the year, and may not start until next week; another mill in the Wheeling district is temporarily inactive, and the converting plant at Mingo Junction will probably be off for a full month about the end of the quarter in order to connect up with the new mills now nearing completion. The bar mill at New Castle was laid off temporarily by an accident Dec. 30. Such conditions a few years ago would have had no effect, but under the present regime every little delay counts. The producers are anxious that the level of from $16.50 to $17 for billets should not be passed, as it is felt that steadiness will be better for all in the long run, and are quoting $16.50, maker's mill, Pittsburg; but when it comes to placing an order for a round lot, even for February, March, and April, difficulty is

experienced, although producers are making efforts to take care of the business. Steel in second hands is held at $17 and upwards, and predictions are made that within 30 days $18 will be the lowest figure at which steel can be obtained. The mills are well filled for the first four months of the year, and have a very good tonnage booked up to July 1. In sheet and tin plate bars the market is still almost wholly nominal. Probably not 5,000 tons have been sold in the open market since the beginning of December. We would quote the price nominal at $17.50, maker's mill, for cut bars. When the tin plate mills ceased buying on the assurance that the consolidation was accomplished, the sheet mills took advantage of the situation and covered fairly well at prices ranging from $16.25 to $16.50. It is given out that they do not need to come into the market for a while yet, and are waiting until the policy of the American Tin Plate Co. is announced. So far it is not learned that this concern has done anything in the matter, although it may be regarded as certain that some well arranged plan is on foot. Wire rods are not in the market, the producers being all absorbed by the American Steel & Wire Co., although it is regarded as probable that some supplies held by outside parties may be guardedly placed on the market.

PLATES.—Following the strength which has steadily developed in the plate market, an advance of a dollar a ton may now easily be quoted, and we give the market as follows: Tank, 1.25c to 1.30c; shell, 1.35c; flange, 1.40c; fire-box, 2c and upward.

SHEETS.—The sheet market is decidedly firmer, and it looks as if this line is taking its place with other branches of the trade in the general advance. It is doubtful if 1.90c can be done at all now for No. 28 common, while 1.95c is quoted, and sales are reported as high as 1.97½c. No. 27 is very firm at 1.85c, a further indication of strength. It is impossible to secure sheets at any price beyond July 1. There is no doubt that determined efforts are being made to bring about a decidedly better state of affairs in the sheet trade, and the prospects are that the movement will be successful. Galvanized iron is much firmer, and but a slight concession can now be had from 80 and 5 off, with a 15-cent freight allowance. It would be utterly impossible to get 80 and 7½.

SPELTER.—Spelter has advanced strongly in the past week, and is quoted at 5.35c in the New York market, with St. Louis 5.10c It is freely predicted that the near future will see six cent spelter in New York and Pittsburg.

IRON AND STEEL SKELP.—Iron skelp has been advanced owing to the heavy advance in gray forge iron, while steel skelp is firmer. We quote iron skelp at 50 cents a ton advance for grooved, and $1 for sheared, with steel skelp nominally the same, as follows: Grooved irons kelp, 1.10c to 1.15c; sheared iron skelp, 1.25c to 1.27½c: grooved steel skelp, 97½c to 1.05c; sheared steel skelp, 1.15c to 1.17½c.

FERRO-MANGANESE AND SPIEGEL.—The first change for some time is noted in ferro, quotations on which are advanced to $52.50, while spiegel is unchanged, though firmer, at $23.50 to $24.

RAILS AND TRACK MATERIAL.—The rail market shows additional strength above the report of last week, and $20, Pittsburg, is talked of, though we still quote $18 to $19. In track material there is a very good demand, and prices are firmly adhered to, as follows: Spikes, 1.45c; track bolts, 1.65c to 1.70c; splice bars, 1.10c to 1.15c; links and pins are quoted from 1.30c to 1.35c.

PIPES AND TUBES.—The market is firm at the advance made week before last. Specifications are coming in with unusul apromptness on old contracts, and some business which was hanging fire has been closed up, while there is the usual figuring on new business, and some good sized orders have been placed with the local mills, which are comfortably filled with orders and expect to run steadily. We quote as follows: Additional discounts:—Five tens and seven and a half for less than carloads with an extra five for carloads; base discounts: —Butt weld, black, 55 per cent off; lap weld, black, 65 per cent off; butt weld, galvanized, 45 per cent off; lapweld, galvanized, 50 per cent off. Discounts on merchant boiler tubes are as follows: 2¼-inch and smaller, 72½ percent off; 2½ inch and larger, 75 per cent off, with an extra 5 per cent to dealers. Inserted joint casing is quoted at 60 off and screw and socket joint casing at 60 and 10 per cent off, with an extra 2½ per cent to dealers.

STRUCTURAL MATERIAL.—There has been considerable closing up of orders with bridge companies and others with whom there were negotiations before the advance, which is being fully maintained for new business. There is a great deal of figuring on structural material for proposed large buildings, a number of which will doubtless come to a head within the next few months. The scattering tonnage booked last week and so far this week is considerably above the average. We quote: Beams and channels, 3 to 15 inches, 1.30c; 18 to 24 inches, 1.40c; tees, 1.30c; zees, 1.25c, and angles, 1.15c.

OLD MATERIAL.—There is considerable activity in this market, and dealers think there should be an advance but so far prices are only firmer, except that old iron rails may be put 25 cents a ton higher. We quote: Old steel rails, long lengths, $10, cut, $10.50; old iron rails, $14.25; wrought iron scrap, $11.50, net valley; cast borings, $5.75; busheling scrap, $9, net; car wheels, $10.25, gross; cast scrap, $9, gross; iron axles, $6, net; steel axles, $12.50 gross; charcoal scrap, $10, gross; wrought turnings, $6.75, net, valley.

CHICAGO.

OFFICE OF *The Iron Trade Review and Industrial World.*
1522 MONADNOCK BLOCK, JAN. 11.

The first market week of the new year resulted in an excellent business in every branch of the iron and steel trade. Sales were good, and in some cases large. Prices are strong, and on several grades of material have been advanced. The new inquiries were large, and give every indication of resulting in considerable business in the near future. Altogether, the first week of the year was very satisfactory, and if the pace set then keeps up, as the dealers are inclined to believe will be the case, the year will be one of the best the trade has ever known.

PIG IRON.—The market is essentially a sellers' market. Furnaces are stronger in their views than has been the case for a very long time, and many orders have been refused in the past week because of the inability of the furnaces to make the required deliveries. A considerable tonnage of business was closed last week by the local furnaces, although most of it was in small lots, and for extended deliveries in the case of anything like large lots. Two orders of 1,500 tons each were closed, and orders ranged from these down to car lots. In every instance the furnaces obtained the full schedule prices for their iron, and in some cases, for special reasons, they secured higher prices. Local furnaces continue to talk higher prices, but so far have made no advances. They say it rests with the Southern furnaces when and how large advances shall be made. The Southern producers are equally firm, and while some furnaces are entirely out of the market on all grades and others on some grades, still other furnaces are asking an advance over the prices quoted in the schedule given below. The low sellers appear to have disappeared entirely. Freight rates, too, are higher, as while no advances have been made, they are maintained at present at the full tariff of $3.10. This has not been the case for several months past. As a result of this we have advanced our quotations 25 cents a ton, the amount the railroads were deducting from the tariff. Quotations are now made as follows:

Lake Sup. Charcoal....	$11 50 @$13 00	Southern Coke No. 3...	$10 85 @ 11 10
Local Coke Fdy. No. 1	11 50 @ 12 00	Southern No. 1 Soft.....	11 35 @ 11 85
Local Coke Fdy. No. 2	11 00 @ 11 50	Southern No. 2 Soft.....	11 10 @ 11 60
Local Coke Fdy. No. 3	10 75 @ 11 00	Southern Silveries.....	11 75 @ 12 25
Local Scotch Fdy. No.1	11 50 @ 12 00	Jackson Co. Silveries..	13 00 @ 14 50
Local Scotch Fdy. No.2	11 00 @ 11 50	Ohio Strong Softeners	12 00 @ 12 50
Local Scotch Fdy. No.3	10 75 @ 11 00	Alabama Car Wheel...	15 00 @ 16 00
Southern Coke No. 1...	11 35 @ 11 85	Malleable Bessemer ...	11 00 @ 12 00
Southern Coke No. 2...	11 10 @ 11 60	Coke Bessemer.....	11 00 @ 12 00

BARS.—The demand has shown a decided increase in the past week, and as a result sales have been larger, several orders of 3,000 tons or over having been given out. Business comes from all sources, agricultural implement manufacturers being the heaviest buyers at present. The market is very much firmer than has been the case of late, and many mills that were selling at low prices recently are now asking the top of the market. Common iron is now selling at 1.10c to 1.15c, and in some cases even higher prices have been obtained. Guaranteed iron is quoted at 1.15c to 1.20c; soft steel bars from billet stock are quoted at 1.10c to 1.15c.

RAILS AND TRACK SUPPLIES.—The local mills secured some business last week at the advanced figure of $20, and Eastern mills also received a few orders. There is considerable business still to be had, and the mills expect a very large tonnage for this year. Quotations are made as follows: Standard section rails, $20 to $22; light rails, $22 and upwards; steel splice bars, 1.15c to 1.25c; track bolts with square nuts, 1.80c to 1.90c; hexagon nuts, 1.90c to 2c; spikes, 1.55c to 1.60c.

BILLETS AND RODS.—No very large business in either billets or rods was closed last week, either by local mills, which are entirely out of the market for the present, or Eastern mills. Billets are quoted at $17.50 and rods at $23.

CAR ORDERS.—The demand for car material is large, and shows that the car works continue to receive good orders for cars, although no especially noteworthy contracts were placed last week.

STRUCTURAL MATERIAL.—Orders last week were hardly as large as were those of the several weeks previous, but were still very excellent, considering the season of the year. Quotations were advanced a week ago, and are now as follows: Beams, 15 inch and under, 1.45c to 1.50c; 18 inch and over, 1.55c to 1.60c; angles 1.30c to 1.35; sheared plates 1.30c to 1.35c; universal plates 1.40c to 1.50c; tees 1.45c to 1.55c;

zees" 1.40c to 1.45c. Small lots from stock are quoted at ¼c to ½c higher.

PLATES.—Orders continue large, considerable business having been placed last week, including orders for 3,000 tons taken by the local mills. The market is very firm. Quotations are as follows Tank plates, 1.30c to 1.40c; flange steel, 1.35c to 1.45c; fire-box steel, 2.25c to 5c.

SHEETS.—Black sheets were in good request last week, and several quite large contracts were included in the week's business. The market is firm. Galvanized sheets were also in fair demand, and sales were as good as could be expected. Quotations are made at 2c to 2.10c for black sheets, and 80 and 7½ per cent off for galvanized.

MERCHANT STEEL.—The mills are inclined to refuse business that does not suit them as to deliveries, and this has reduced the volume of business to some extent. Notwithstanding this, a good week's trade was had. Quotations follow: Open-hearth spring tire and machinery steel, 1.65c to 1.75c; smooth finished machinery steel, 1.60c to 1.70c; smooth finished tire, 1.50c to 1.60c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

SCRAP.—Considerable business was done last week in some grades of scrap, and the demand appears to be increasing somewhat. Other grades are in light demand, and sales were small. Dealer's selling prices are as follows:

Old iron rails, gross,	$13 00@$13 50	Axles, net	$14 50@$15 00
Old steel rails, long, gr.	10 50@ 11 00	Cast borings, net	4 25@ 4 50
Old steel rails, short	8 75@ 9 00	Wrought turnings, net	6 00@ 6 50
Old wheels, gross	11 50@ 11 75	Axle turnings, net	7 00@ 7 25
Railroad forge, net	11 50@ 12 00	Mixed steel, gross	7 45@ 7 50
Dealer's forge, net	10 00@ 10 50	Stove plates, net	5 75@ 6 00
No. 1 mill, net	8 50@ 8 75	Heavy melting steel, gr.	8 25@ 8 50
Heavy cast, net	8 50@ 9 00	Old iron splice b., net.	12 75@13 00
Malleable cast, net	8 00@ 8 50		

CLEVELAND.

OFFICE OF *The Iron Trade Review and Industrial World.*
27 VINCENT ST., Jan. 11.

Unexpectedly the ore freight market opened the past week and at this writing enough has been done to fix the basis for 1899. Contrary to all calculation this is 60 cents from the head of the lake for the season. It need not be said that this duplication of the season rate of 1898 will have its effect upon the price of ore, for it removes from the account one of the factors of increased cost on which the talk of probably higher ore has been predicated. The allowances in these preliminary discussions have been 5 and 10 cents beyond the 1898 basis for ore charters; but seemingly the vesselmen have again consulted their fears, even at the opening of a year that by common consent is to break all tonnage records. The Carnegie-Oliver ore interest has been first to cover, and once it became known that 60 cents had been done there was little trouble in getting more at the same figure. It is reported that the Carnegie Co.'s large requirements of Duluth and Ashland tonnage, amounting to about 3,000,000 tons, are now completely covered. The Carnegie ore on the Menominee range, it is understood, has not yet been provided for. On the heels of this large business other shippers came into the market on Tuesday of this week and were able readily to cover over 1,000,000 tons of ore at 60 cents. In fact, much more tonnage was offered at 60 cents than shippers were able to take. The conclusion to be drawn is that the 1898 balance sheets of the companies owning 5,000 and 6 000-ton boats have shown a fair profit at 60 cents and that the owners are willing to try conclusions with another season on the same basis in spite of the general disposition—because of the decrease in the supply of lake tonnage—to look for an advance of 5 cents this year. The ore situation has not been developed in the week by any action of furnacemen or sales agents, except as the latter have taken vessel room in advance of sales. No appointment has been made as yet for a meeting to consider prices of Bessemer ore.

PIG IRON.—The market is quieter but maintains its strength, so far as prices are concerned. In Bessemer iron there is no new buying in any considerable quantity, though a few transactions are reported at $10.50 valley furnace. Foundry iron is sold at $9.75 valley furnace for No. 2, and one or two producers have their figure at $10 and are making sales. There has been some inquiry from near-by foundries in the past 10 days, but no large amount of business has been closed. Southern furnaces are declining business and hope to hold the demand back for a time until some headway can be made on order books. Forge iron is firm at $9.50 to $9.75 valley furnace and is approaching nearer to the basis of Southern. Some business in ferro-manganese and spiegel has been done recently, a 10,000 ton transaction in the latter having been closed. Ferro is $2 a ton higher—$52, Pittsburg. We quote pig iron, f. o. b. Cleveland:

Bessemer	10 90	Valley Scotch No. 1	$10 65@10 90
No. 1 Strong Foundry	10 65@10 75	Valley Scotch No. 2	10 25@10 40
No. 2 Strong Foundry	10 25@10 40	Gray Forge	9 90
No. 3 Foundry	10 00	Lake Superior Charcoal	11 50@12 00

BILLETS AND RODS.—There is little steel to be had for early shipment except from middle hands. We quote $16.75. Rods are not to be had from local sources, large shipments to the Chicago district being made week by week. We quote $22.50 to $23.

FINISHED MATERIAL.—Bars are responding to the advance in steel. Some business in steel bars has been refused in the week at 1c, Pittsburg, the mills being especially crowded with orders for smaller sizes. Where plate mills are not full for months ahead on big contracts, they are disposed to take only moderate orders, so as to be in shape to supply the small order demand as it comes up; in some cases it will be impossible to consider anything for weeks to come. We quote 1.25c, Pittsburg, as minimum for tank. On heavy sheets there is an advance; lighter gauges are on the basis of 2.05c to 2.10c Cleveland, for No. 28. We quote beams and channels at 1.40c; angles, 1.25c; bar iron at 95c to 1c valley. Wire and nails have jumped, in view of the practical consummation of the American Steel & Wire Co. deal. The advance is about $4 a ton to the small trade, as compared with three or four weeks ago. We quote wire nails at $1.45 base, the jobbing rate, with $1 a ton advance for carload lots to the general trade and $2 a ton for less than carloads. Smooth wire is $1.30 base; barbed wire, $1.55; galvanized, $1.90.

OLD MATERIAL.—There is a good amount of trading in nearly all lines. We quote No. 1 wrought scrap at $12 valley; old iron rails, $14.25, and probably more would be paid for a round lot; old steel rails, $9.75; car wheels, $10.50 to $11, Cleveland; machinery cast scrap, $8.25 to $8.50; wrought turnings, $7; cast borings, $5.50; stove plate, $6.

CINCINNATI.

Jan. 10.

There is very little of moment in the market for Southern iron just now. As far as sales agents are concerned, their principal correspondence with the furnaces appears to be to acknowledge receipt of instructions to withdraw this and that grade from the market as the furnaces are oversold; unless, indeed, they acknowledge receipt of instructions not to sell any grade whatever. This has been now a steady thing for three weeks until there is very little Southern iron left on the market to offer. Fortunately however, there has been within the past 10 days a let-up in inquiry, so that the feelings of sales agents are not being lacerated as badly now as previously, in having to turn down old customers with the statement that they could not take care of them. Shipments are going forward at an exceedingly rapid rate and iron yards in the South are swept and garnished. There is not a furnace company in the South that has any stock of iron on hand. One company that a year ago had in stock over 16,000 tons and which even then had the reputation of keeping closely sold up has to-day less than 300 tons. The heavy English buyers are willing apparently to pay the advanced prices, but as in the case of the domestic buyers their offers are being rejected because of a lack of iron. It is the one desire now of the iron masters to be let alone for two or three months so as to reduce their order books and get themselves in something like their normal condition. They discountenance any attempt to boom prices further. There are constantly rumors of freight advances in the South, but the furnace companies contend that this would be a detriment to the business now, for prices are very much lower than they were when the higher freight rates prevailed. In the North, transportation companies are holding firm to published tariff, and it really looks as if the railroads would, by their firmness, be able to largely increase their earnings without detriment to either producers or consumers. We quote for cash f. o. b. cars Cincinnati: Southern Coke, No. 1 foundry, $10.50; No. 2, 10.25; No. 3, $9.75; No. 4 and gray forge $9.25; mottled, $9.25; No. 1 soft, $10.50; No. 2, soft, $10.25, Hanging Rock charcoal, No. 1, $15.50 to $16; Jackson Co. silvery; No. 1, $12.50 to $12.75; standard Georgia car wheel, $14.25 to $15.

Iron and Steel Consolidation Stocks.

The recent deals and rumors of deals in connection with the three iron and steel "trust" stocks have made the quotations and transactions in them of special interest. The feature of Monday's trading at New York was the sale of 100,000 new American Steel & Wire subscriptions at 109. The preferred stock "when issued" sold at 92 and the common stock "when issued" at 34½. At Chicago on Monday the present American Steel & Wire preferred was quoted 111 and the common, 43; American Tin Plate preferred, 97¼; common, 41¼. Federal steel on the New York exchange closed Monday at 84¼ preferred; common at 54¼.

THE *American Manufacturer*, with its new cover, new type and its two wide columns to the page, instead of three, presents a much improved appearance.

THE IRON TRADE REVIEW
AND
INDUSTRIAL WORLD.

DEVOTED TO MACHINERY, METAL-WORKING AND FOUNDRY TRADES AND IRON AND STEEL MANUFACTURE.

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JANUARY 12, 1899.

CONCENTRATION IN MACHINERY TRADE.

While the tendency for some years in manufactured iron and steel has been toward the most direct communication between the manufacturer and the consumer, without the intervention of broker or agent—and this has been particularly emphasized in the Pittsburg district—there is some indication of centralization in the trade in machine tools. One step toward the sole agency system has been announced recently by a well known firm of machinery dealers, who have exclusive representation in Chicago and the Northwest for a number of tool-building concerns. If such concentration of the selling side of the machinery business by bunching in the hands of a single house, various companies—one each from a number of non-conflicting lines—should become the rule, there would be in time an entire divorce of manufacturing and selling. The manufacturer would hear of the needs of the trade through the selling agency and would be practically cut off from communication with the users of his tools.

On the face of it such an arrangement, while apparently in line with the popular combination policy, in its saving of agency expenses, is at variance with principles which the concentration movement thus far has generally regarded. These are, that the closer the manufacturer is to the consumer the more closely will he adjust his product to the consumer's wants; and that if any considerable reduction in costs is to be attained, it must be sought in a large scale of manufacturing operations and in the economies of concentrated production. However, from the tone of the *American Machinist's* comment, it is to be inferred that the machine tool world is not alarmed at the new development:

Those of our readers who may prefer to keep control of the selling end of their business and who may possibly have become alarmed at this "announcement," and what it seems to portend, may rest easy. This effort to control the selling end of the machine tool business is not the first one that has been made, and we have good reason to believe that the present effort, though carried on with considerable boldness, we must admit, will not succeed in anything like the degree indicated. The bulk of the machine tool business of this country will, we believe, continue to be conducted by the men whose genius and ability have built it up to its present magnificent proportions, and the experience of the comparatively few who have tried the plan of leaving their market entirely in the hands of others, very plainly teaches the unwisdom of that plan. The pronunciamento is simply laughed at by those who know the tool business.

Yet it need not be concluded that the machine tool industry, on its manufacturing side, will altogether escape the decided drift toward combination that is the one pronounced feature of industrial life in the United States to-day. The surprise is that the machinery business has maintained for so many years such a numerous and diversified array of individual producers.

Bellaire Steel Co.

A press dispatch of Jan. 9 says that a deal is under way for the sale of the Bellaire Steel Co. to the Federal Steel Co. and adds that on the basis of 226 for the stock the proposition means about $2,300,000 for the plant. The dispatch is evidently in error so far as the Federal Steel Co. is concerned. The American Tin Plate Co. has been credited in the trade with purposing to acquire the Bellaire plant, since the latter has had in the past few years a very satisfactory sheet bar business from tin plate mills now in the combine.

Every day has its dispatch of a concentration deal, large or small, in the iron trade. One of the last week's contributions is the report that the American Tin Plate Co. has acquired the Buhl Steel Co.'s basic open-hearth plant at Sharon, Pa. We are advised that there have been no negotiations looking to such transfer.

A CHICAGO dispatch says that the Pullman Palace Car Co. has accepted the decision of the Supreme Court of Illinois. The decree will divorce the great corporation from everything save the business for which it was incorporated. Pullman's churches and schools, hotel, magnificent Arcade Hall, market house, public library, and 2,000 brick residences will be sold to the highest bidders. The Pullman Iron & Steel Co. will be reorganized. The brick works will pass from the control of the company. The streets of Pullman will be given over to the authorities of the city of Chicago and the water works will pass into the control of the city.

FREDERICK H. MASON has opened an office at 1020 Monadnock Block, Chicago, as a consulting engineer. Mr. Mason will also act as the Western representative of the Frankford Steel & Forging Co., of Philadelphia, Pa. He has been associated with several engineering concerns in the West, and lately was connected with the Railroad Supply Co., of Chicago.

THE validity of storage warrants issued under the methods adopted by the Guaranty Storage Warrant Co., of Chicago, has been affirmed again, this time in a Chicago court decision which asserts the right of a storage company to occupy under lease private elevators, in part or entire, and under proper forms and inspection to receive and maintain possession of grain stored therein.

J. F. CORLETT, whose office heretofore has been in the Perry-Payne Bldg., Cleveland, has removed to 409 in the same building, into larger quarters. Mr. Corlett represents the Syracuse Tube Co., Lukens Iron & Steel Co., A. & P. Roberts Co., Latrobe Steel Co. and Burgess Steel & Iron Works.

A MOVEMENT is on foot looking to the formation of a company to acquire the fire brick companies of the United States. President Savage, of the Ashland Fire Brick Co., Ashland, Ky., and other manufacturers have done some preliminary work on the project, which in the nature of things will be slow of consummation, if, indeed, there is any possibility of agreement.

BETHLEHEM PLATE MILLS SOLD TO CARNEGIE STEEL CO.

(Special Telegram.)

PITTSBURG, Jan. 11.—An important deal looking to the concentration of plate production in Pittsburg has just been closed. The Carnegie Steel Co., Ltd., has purchased from the Bethlehem Iron Co. one slabbing mill, one 120-inch plate mill and one 42-inch universal plate mill with all appurtenances. These mills, which are almost new, will be removed to Homestead and will be set up in the new plate plant under construction. Contrary to report, the transaction does not include any part of the Bethlehem armor plate plant. It points to an increasingly large development of plate production in Pittsburg, and the retirement of an important Eastern competitor from the manufacture of wide plates. That Pittsburg's export tonnage in plates will be greatly increased in 1899 goes without saying.

The Carnegie Steel Co., Ltd., has just begun work on a large addition to its basic open-hearth steel capacity. Ten 50-ton furnaces will be built.

The Foundrymen's Associations.

Secretary Penton, of the American Foundrymen's Association, announces that the executive committee, after conference with the local committee, has fixed Tuesday, Wednesday and Thursday, May 16–18, as the time of the annual convention, which will be held this year in Pittsburg. With so live a local organization as that at Pittsburg in charge of the meeting, it is safe to predict that it will be made in many respects the best in the association's history.

THE next meeting of the Western Foundrymen's Association will be held at the Great Northern Hotel, Chicago, Wednesday, Jan. 18, at 7:30 P. M. The paper by Max H. Wickhorst, on "Porous Castings and Occluded Gases," read at the December meeting, will be discussed. The following amendment to the by-laws, presented at the November meeting, will be considered: "Resolved, That Art. II., Sec. 3, be amended to read as follows: The annual dues of each corporation or firm shall be $10, payable quarterly in advance, but the annual dues of each member not engaged as a manufacturer or jobber in his own name shall be $5, payable quarterly in advance.'" The topical questions previously announced will come up for discussion.

THERE were 35 members and visitors in attendance at the monthly meeting of the Foundrymen's Association at Philadelphia, Jan. 4. The address of the evening was by John Birkinbine, on "The Basis of the Iron Industry." Mr. Birkinbine with the aid of lantern slides, gave an account of the operations connected with the mining, transportation and handling of iron ore and followed it through the furnace to the pig iron as delivered to the foundry. The speaker's intimate acquaintance with the Lake Superior iron ore industry made his well selected views and his clear and well-digested explanations peculiarly interesting.

Bursting of the Gatling One-Piece Gun.

The second series of shots fired with the Gatling one-piece steel gun at Sandy Hook last week resulted in the bursting of the gun at the 15th discharge, the firing pressure being 36,500 pounds. The regulation service charge was used. There is a difference of opinion as to the effect of this failure. It is possible that another appropriation will be made for further tests, but the chances are not good, from the present outlook. That an alloy can be used which will produce a steel sufficiently strong after proper heat treatment and handling to resist the severe stresses required is still insisted by Dr. Gatling and his friends. In a letter to one of his associates, Dr. Gatling says that he expects to ask for another appropriation and is not at all disposed to think that failure has been proved. "Five rounds of 142 pounds of powder charge each were fired from my 8-inch gun, one of the charges giving a pressure of 39,500 pounds; extraordinarily great. The standard charges used in the built-up 8-inch guns have been 125 pounds, giving a pressure of 34,000 pounds to the square inch. It will, therefore, be seen that my gun has been subjected to a much more severe test than has been applied to the built-up gun of like caliber."

TIN PLATE COMBINE'S PRICE POLICY.

The American Tin Plate Co. has at last announced the prices at which it will sell its product. The price reported is $3 per 100-lb. box at mill to the largest jobbers, and $3.10 to carload buyers. In New York no one but the "Big Four" will be recognized as jobbers. The "Big Four" are Bruce & Cook, Dickerson, Van Dusen & Co., Phelps, Dodge & Co., and Robt. Crooks & Co. There is another report that Phelps, Dodge & Co. are special Eastern agents of the combine. Outside of New York City two or three jobbers may be recognized, perhaps one in Boston, another in Philadelphia, and another in Baltimore. For odd sizes 10 cents a box additional will be charged, and if less than 50 boxes of a size, another 10 cents.

The individual manufacturers long endeavored to make these extra charges, but could not maintain them, although extra expense was always entailed in getting out small orders of these sizes. The regular sizes are those used by can makers, and include 14x20, 20x28, 10x14, 10x20, 14x19¼, 14x18¾, 13½x19¼, 11½x23, 12x24, 14x28, and several others. Taking into account the advances in steel and pig tin, the new price is about equal to the average price in January of last year, when $2.75 was quoted, the advances in the two raw materials increasing the cost of manufacture about 25 cents a box, but during the spring and summer tin plate declined from the January price, while the raw materials were advancing. It is expected that a further advance will be made. While the price is based on $3, and $3.10 at mill respectively, no prices will be named except delivered prices, the average freight being added to the point of destination from the district in which the order will be filled, with the exception that Chicago prices will be maintained at about the same level as New York prices. During the importing period, and early in the history of the home manufacture, the Chicago price was always the New York price with the freight added, while latterly the Chicago price has been below the New York price. In general the new system of selling will result in lower freights, and taking prices at mill as a basis, there will be a saving in this respect to the consumer, except in the case of Chicago, as noted.

It was at first intended that the president of the new company should receive $50,000 a year, the vice-presidents $25,000 each, and other officers in proportion, but in the past few days it has been decided to proceed on lines of the strictest economy in this direction, and a rule has been made that the maximum salary for any one office shall be $10,000 a year. The directors receive nothing as directors, but may receive salaries for filling other positions in the company. Last week the preferred stock fluctuated around 98 and the common 41½, or 139½ for stock which was made equivalent at 100 for cash in paying for the plants, so that it may be said that the stock has advanced 39½ per cent since the subscriptions were received from the mill owners.

It has been persistently reported within the past week that the American Tin Plate Co. had purchased the entire equipment of the Canonsburg Iron & Steel Co., Pittsburg, with sheet and tin plate plant at Canonsburg, Pa. The report is without foundation. There have been some negotiations in the matter, extending over a considerable period, but nothing has been concluded.

AT New York, Jan 5, the American Asiatic Association elected the Pittsburg Wire Co., and Jones & Laughlins, Ltd., of Pittsburg, to membership.

The A. Garrison Foundry Co., of Pittsburg, has in the sand a housing casting which will weigh 34 tons when completed. In lifting the mold a chain 1¼ inches thick in the links was broken. The casting is to be used in a mill near Joliet, Ill.

A Middleboro, Ky., dispatch says that C. P. Perrin has floated bonds for $300,000 for the Watts steel plant and the plant resumes at once.

A Pennsylvania Railroad official says that the 85-lb. steel rails on the main line will be replaced with 100-lb. rails. The work is expected to take about two years.

Greater American Steel and Wire Co.

One after another the pending deals for the purchase of rod, wire and wire nail plants outside the American Steel & Wire Co. have been brought to completion in the past 10 days. To-day only formalities stand between the big company and complete control of every important rod and wire plant in the country. Details of terms are meager, though it is evident from the capitalization announced for the expanded company that the valuations of one year ago, on which an $87,000,000 capital was planned, have been closely approximated in the recent deals. The following statement given to the press at Worcester, Mass., by the Washburn & Moen Mfg. Co., indicates the liberal basis on which purchases have been made:

"An arrangement has been concluded under which a controlling interest in the stock of the Washburn & Moen Mfg. Co. will change ownership. All stockholders will be given an opportunity of participating in this arrangement on exactly the same terms, the details of which will be communicated to them by circular during the coming week. It is understood that the price to be realized is something over $200 a share."

This would indicate that the American Steel & Wire Co. is bound to purchase all the stock of the Washburn & Moen Co. that may be offered it at 200, which means $8,000,000 for the plants and business. This is the figure which the J. P. Morgan syndicate considered $2,000,000 too much one year ago. In the case of the Cleveland Rolling Mill Co., also, it is understood that the combine is to buy all the stock that may be offered it at the same rate as was paid for the majority which it now has under options expiring Jan. 18.

The Oliver & Snyder Steel Co. deal was formally closed last Saturday. It includes the Edith Furnace, instead of Rosena, with the steel works and the Oliver Wire Co. plant. The Oliver coke plant and the Oliver interest in the Oliver Iron Mining Co. are not transferred. The destination of the Oliver one-sixth of the product of Carnegie-Oliver mines, apart from what Rosena Furnace requires, is not announced as yet.

The expectation that the Cleveland Rolling Mill Co.'s open-hearth steel works will be considerably extended under the new ownership seems to insure a market for basic iron to the extent of part of the product of one Cleveland merchant furnace, as the three stacks of the Cleveland Rolling Mill Co. would be fully occupied on iron for the Bessemer steel plant.

The following circular issued by the directors of the American Steel & Wire Co. indicates fully the extent of the deals and the basis of the stock transfers that are to be made:

Notice to Stockholders of the American Steel and Wire Co.

NEW YORK JAN. 7, 1899.

DEAR SIR:—During several months past the holders of a large portion of the shares of the American Steel & Wire Co. have been carefully considering the advisability of obtaining by purchase or reorganization, other leading wire concerns in the United States, among them the Cleveland Rolling Mill Co., of Cleveland, O., manufacturers of pig iron, Bessemer steel and open-hearth steel, as well as wire in its various forms, and the Washburn & Moen Mfg. Co., of Worcester, Mass., and Waukegan, Ill. It is believed that there would result greater economy in management and operation and thereby be of advantage to all the stockholders of the several companies. After a thorough investigation of the several properties and their values, actual as well as relative, the acquisition of the following plants has been assured upon a just and fair basis:

Washburn & Moen Mfg. Co., of Worcester, Mass., and Waukegan, Ill.,
Worcester Wire Co., of Worcester, Mass.,
Cleveland Rolling Mill Co., of Cleveland, Ohio,
New Castle Wire Nail Co., of New Castle, Pa.,
Pittsburg Wire Co., of Pittsburg, Pa.,
Oliver Wire Co., of Pittsburg, Pa.,
Oliver & Snyder Steel Co., of Pittsburg, Pa.,
Cincinnati Barbed Wire Fence Co., of Cincinnati, Ohio,
Laidlaw Bale & Tie Co., of Joliet, Ill., and Kansas City, Mo.,
Consolidated Barb Wire Co., of Lawrence, Kas., and Joliet, Ill.,
Newburgh Wire & Nail Co., of Newburgh, N. Y.

To accomplish the object suggested, the following plan has been agreed upon: Agreements have been entered into for the organization of a corporation under the laws of the State of New Jersey, to be known as the American Steel & Wire Co. This corporation will have an authorized capital stock of $90,000,000, of which $40,000,000 will be 7 per cent cumulative preferred stock, and $50,000,000 will be common stock. This corporation will acquire the above properties either by direct ownership or through the ownership of not less than a majority of the capital stock, where it is not practicable to purchase the properties themselves. A syndicate has been formed, which will furnish the necessary capital for the above purchases, and in addition thereto provide the new company with a working capital of about $13,000,000, exclusive of the working capital of the several concerns which will enter the new corporation. Whatever may be necessary of this working capital may be used for the purchase of other properties, which may be agreed upon hereafter, the entire amount of capital to be furnished by the syndicate being $28,000,000.

The syndicate agreements will provide that the New Jersey company shall acquire such of the capital stock of the American Steel & Wire Co., of Illinois, not less than a majority thereof, however, as may be offered, on the following basis:

For each share of the preferred stock of the Illinois corporation the holder thereof shall receive one share of the 7 per cent cumulative preferred stock of the New Jersey corporation and in addition thereto six-tenths of one share of the common stock of the New Jersey corporation; for each share of the common stock of the Illinois corporation the holder thereof shall receive one and two-tenths shares of the common stock of the New Jersey corporation. It is further arranged that the banking house of J. & W. Seligman & Co., of New York City, or its agent for that purpose, the Illinois Trust and Savings Bank, of Chicago, Ill., will exchange the certificates of the American Steel & Wire Co., of Illinois, on the above named basis, provided the same are presented and deposited at either of the offices above named on or before Tuesday, Jan. 17, 1899; that in event of delay in issuing the certificates of the New Jersey corporation, interim certificates will be issued exchangeable for the engraved certificates when issued. The interim certificates will be issued by either J. W. Seligman & Co., at New York, or their agents the Illinois Trust and Savings Bank, at Chicago.

It is very desirable that the fiscal year of the New Jersey corporation commence on Jan. 1, 1899, and to that end the plan must be consummated at the earliest possible date; therefore the stockholders in the American Steel & Wire Co., of Illinois, are requested to present and deposit their stock promptly, so that the same may be speedily and without delay exchanged, and the organization of the New Jersey company facilitated. Books of transfer of the American Steel & Wire Co., of Illinois, were closed on Wednesday, Jan. 4, 1899, and will not be reopened until about Jan. 25, 1899, and the books of the New Jersey corporation will be opened as soon as the engraved certificates are ready for delivery, not later, however, it is believed, than Jan. 25, 1899.

It is proposed that the new company will declare regular quarterly dividends on the preferred stock of 1¾ per cent, beginning about April 1, 1899.

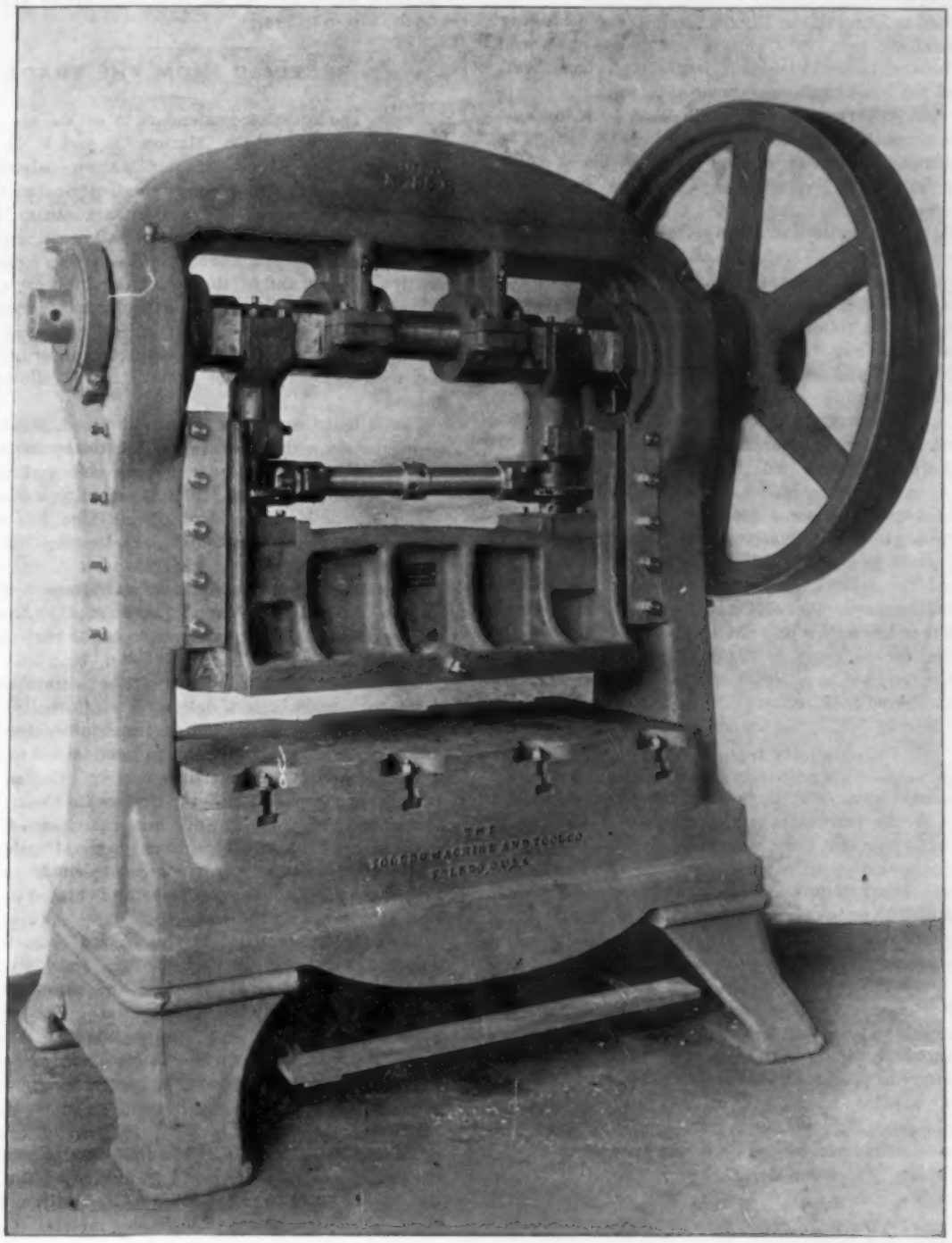
The undersigned, comprising the entire board of directors of the American Steel & Wire Co., of Illinois, after a careful consideration, believing that the consummation of the plan proposed will increase earnings, decrease expenses, result in a more stable cost of manufacture and more satisfactory results to the stockholders, have decided to exchange their own shares in the Illinois corporation for shares in the New Jersey corporation, upon the above named basis.

J. W. GATES,	JOHN LAMBERT,
A. CLIFFORD,	F. BAACKES,
I. L. ELLWOOD,	E. H. GARY,
CHAS. DOUGLASS,	E. J. BUFFINGTON,
WM. EDENBORN,	W. H. ROWE,
S. H. CHISHOLM.	

THE Fisher Machinery Co., Chicago, recently placed an order for a large amount of power transmission machinery to be shipped to Kansas. The Rice Machinery Co. has the contract.

SPECIAL FLY-WHEEL PRESS.

The machine illustrated is the No. 95 special plain fly wheel press of the Toledo Machine & Tool Co., Toledo, O., designed expressly for blanking, cutting, forming and perforating in large sheets of thin metal, such as is used in the manufacture of steel ranges, gas stoves and heaters. It weighs 11 tons, has a 66-inch fly wheel weighing 2,400 lbs., and is provided with an improved automatic three-pin clutch. It also has an improved bevel gear adjustment, easy to operate, and is accurate in adjustment. This is regarded a marked advance over the form of ratchet usually used on double pitman presses, as the ratchet palls sometimes skip a tooth and will therefore get the slide out of alignment. By using this adjustment this difficulty is overcome entirely.



SPECIAL FLY-WHEEL PRESS.

The press is arranged so that gearing can be attached with very little extra work at any time it may be required. It is built in various widths, and with opening in bed to suit the work required.

PRODUCTION of Scotch pig iron in 1898 is put by cable advice at 1,654,617 tons. The reduction of stocks in store in the same period was 74,008 tons, making the apparent consumption 1,264,272 tons, a gain of 33,000 tons over 1897.

PERSONAL.

President C. M. Schwab, of the Carnegie Steel Co., Ltd., gave a dinner Saturday evening to the officials and superintendents of departments, of the Carnegie Steel Co. Covers were laid for 37. Last year the department heads gave a complimentary dinner to President Schwab on the completion of his first year as president of the Carnegie Steel Co. The dinner of Saturday evening was in view of President Schwab's early departure on a European trip. The menu cards bore photogravures of a number of the operating officials of the company. Charles L. Taylor presided as toast-master, and toasts were responded to by Louis T. Brown, Charles M. Schwab, William E. Corey, H. J. Lindsay, Emil Swenson, D. M. Clemson, J. E. Schwab, Thomas Morrison, W. B. Dickson, James Scott and J. G. Hunter.

Chief Engineer Walter M. McFarland, lately chief assistant to Commodore George W. Melville, engineer in chief of the Bureau of Steam Engineers of the United States Navy, has entered upon his new duties as assistant to B. H. Warren, vice-president and general manager of the Westinghouse Electric & Mfg. Co.

The officers and department heads of the Illinois Steel Co., to the number of 37, gave a banquet at the Calumet Club,

Chicago, Dec. 31, to the retiring president, John W. Gates. The affair was arranged as a testimonial of the regard in which Mr. Gates is held by his former associates in business, and only the immediate official family of the company was included in the invitations. During the dinner Mr. Gates was presented with a handsome loving cup. The menu was very elaborate.

J. C. Munn, of the Pittsburg Bridge Co., has been elected secretary and general manager of the company. L. A. Afielder, Jun., A. S. C. E. has been appointed assistant engineer, succeeding H. H. Rosseau, recently appointed civil engineer, U. S. Navy.

At the annual meeting of the Illinois Commercial Traveling Men's Association, held in Chicago, last week, the well known iron broker, James O'Donnell, was elected president. M. O'Donnell has lived in Chicago since 1852, with the exception of four years' service in the Civil War. For over 27 years he was connected with Kelley, Maus & Co., Chicago, as traveling salesman, and is at present doing business under his own name at 10 to 24 South Water st., Chicago, as a dealer in iron and steel products.

Clement F. Street, editor and manager of the *Railway Review*, Chicago, for seven years, and before that chief draftsman for the Chicago, Milwaukee & St. Paul Railroad, at Milwaukee, has accepted a position with the Dayton Malleable Iron Co., Dayton, O., to look after its railroad business. The malleable company has just completed extensive improvements in equipment and additions to capacity.

Superintendent John Stevenson, Jr., who was injured by the bursting of a fly-wheel at the Shenango Valley Steel Co.'s plant at New Castle, Pa., as noted last week, is not in so critical a condition, his friends will be glad to know, as first newspaper accounts indicated. A broken leg will keep him to his room, however, for some time.

The estate of John W. Chalfant, of Pittsburg, is put at $650,000, of which $550,000 is personal property.

The will of the late W. Dewees Wood was probated at Pittsburg on Tuesday. The estate is valued at about $1,000,000 and is left to the widow and children.

J. S. Keefe, for 10 years traffic manager of the Illinois Steel Co., has resigned to accept a similar position with the new American Steel & Wire Co.

Philadelphia Iron Market.

Jan. 10.

There has been no special buying in the past week, but the strength of the market is emphasized in a number of ways. Sellers know that their customers are covered, for the most part, for several months ahead, and are not disposed to encourage any effort to provide against the remote future. Some quotations have been made with the evident purpose of checking business. Producers are not cultivating a boom; indeed they are doing all they can to avoid one. The belief of the best heads in the trade is that there will be enough to go round if consumers seek to cover only legitimate needs—that is, contracts in hand and business that will come in the ordinary course of things in the next six to nine months. There is a study to preserve a stable market; and the big producers in various lines having sold up well into 1899 are not disposed to help on high prices in the few months ahead, with the probability that by the time they are able to sell again with ordinary freedom the market would be on the descending grade. There is not a little talk of combination movements, these including some undertakings in connection with the export trade in iron and steel. Foreign buyers are reported to be taking an interest in the market here, some of them with a view to some speculative engagements in pig iron, billets and sheet bars. The reported negotiations for bringing some of the leading Virginia furnaces under one ownership have made some progress, but the deal is not as yet a market factor. The capacity of the nine Virginia coke furnaces active is about 6,500 tons a week, and of the 13 idle coke furnaces about 8,300 tons. The sharp competitions of Virginia furnaces with those of Eastern Pennsylvania and with each other have made this market an unprofitable one until very recently, and the margin for furnaces of only moderate capacity is still none too good. We quote No. 2X foundry at $11.25 to $11.50, tidewater; No. 2 plain, at $10.75 to $11; No. 3 foundry at $10.50; standard mill iron at $10.50 to $10.75. Billets are very firm and little steel has been sold. Offers of $18.50 have been refused for the first half; though that ought to be done on January and February deliveries. The advances in finished materials have held; bars being quite a little firmer and only light sheets remaining practically unchanged. We quote plates at 1.35c to 1.40c; beams and channels at 1.45c up to 15 inches: angles, 1.30c; refined bars, 1.15c to 1.20c; test bars, 1.25c to 1.30c. In old material not enough has been done to establish a new list of prices but holders are asking more money. We quote heavy steel scrap at $11 to $11.50; machinery cast scrap, $9.25 to $9.75; old iron rails, $13 to $13.25; old steel rails, $11 to $11.50; old car wheels, $10.50 to $10.75.

RECEIVED FROM THE TRADE.

Among the latest 1899 calendars to arrive are those of the Marion Steam Shovel Co., Marion, O., and R. D. Nuttall Co., Pittsburg. The banner of the Marion calendar is 14x18 inches, bearing in strong colors an allegorical picture "Invention's Gift to Labor." The Barnhart steam shovel, on a sphere of blue, and the legend, "Used in all quarters of the globe," stand out prominently between the figure of the inventive goddess and of the exhausted laborer who has cast aside his shovel. The Nuttall calendar has a great gear wheel for its center piece, a pinion at its side, and the various specialties of the company prominently inscribed in connection with the words "the gear cutters" following the firm name.

The Millett Core Oven Co., Brightwood, Mass., remembers its customers with a nickeled steel letter opener with flat celluloid handle—the firm name on one side and on the other: "Sole manufacturers of Millett's patent core oven."

The Moline Malleable Iron Co., Moline, Ill., sends out its usual daily calendar pad, each leaf bearing the firm's characteristic red shield.

A double-pocket Russia leather card case comes from the Cherry Valley Iron Works, Leetonia, O. A memorandum filler, with calendar fly-leaf completes the very convenient and useful souvenir.

A second illustrated edition of the lecture on mechanical draft for steam boilers delivered at Cornell University by Walter B. Snow, of the engineering staff of the B. F. Sturtevant Co., Boston Mass., has just been issued to meet the demand for information on this subject Copies may be obtained upon application to the Sturtevant Co.

Matthew Addy & Co., pig iron merchants Cincinnati, O., with offices also at Chicago, St. Louis, Pittsburg and New York, have issued a very handsome calendar for 1899. It is printed in vivid colors, and is well calculated to attract attention as it hangs on the wall.

The calendar sent out by the Inland Iron & Forge Co., Chicago, with works at East Chicago, Ind., is very attractive. The center piece is a picture of the company's works, this being surrounded by the type matter. The company manufactures bar iron and steel, angles, channels and special sections, and iron and open-hearth steel car axles. The offices of the company are in the Marquette Bldg. P. D. Block is president, S. J. Llewellyn, vice-president, G. H. Jones, secretary and treasurer and L. E. Block, general manager.

The S. Obermayer Co., Cincinnati and Chicago, manufacturer and dealer in "everything needed in the foundry," announces molders' wax tapers as a late addition to its specialties. These tapers are an improved method of venting cores, where complicated connections have to be made, in allowing the free flow of gas from the core. As in making port cores for cylinder work, it would be very difficult and slow work to connect all the vents made by the ordinary method of wire-venting, whereas the taper can be rammed up in the core and left there. The heat melts the wax and leaves a perfect connection for vent. In other work, also, the taper can be used to good advantage, and at considerable saving of labor.

The reduction in warrant yard stocks of pig iron was just 125,000 tons in 1898, the total on hand Dec. 31 being 150,800, as against 275,800 tons the year previous. The amount withdrawn in the last 10 days of the year was 4,500 tons. None was put in in that time. The total, Dec. 31, 1896, was 200,700 and on Dec. 31, 1895, it was 106,200 tons.

AMERICAN MACHINERY ABROAD.

Consul Halstead's reports to the State Department on the condition and possibilities of American trade in iron and steel and machinery in the Birmingham, Eng., district, have been marked by a closer study of conditions than is made by the average consular representative. Mr. Halstead, not content with presenting a layman's view, has interviewed experts in various lines and presented their comments in their own language. In the machinery trade he found a complaint by salesmen representing American manufacturers that the home concern did not adopt, as readily as the salesmen had a right to expect, the latter's suggestion of adaptations that require to be made, to the English purchasers' methods and practice. A bright American salesman, who had been in England some time, told Mr. Halstead that screw machines, for example, should be built with a view to some lee-way in the stock run in it. The latter is none too even in the Birmingham district. "Taking into consideration this fact, that such a large proportion of the bar material used in this vicinity is of a most uneven kind, I would advise our home shops, in fitting up machines coming here, to avoid the use of box tools which have a guide in front of a cutting tool, except in cases where it is absolutely certain that proper material is going to be run in the machine."

The same salesman makes these general observations on the requirements of English purchasers of American tools:

Too Great Accuracy a Drawback.

"Considerable time and expense might be saved in the fitting up of special tools if the home shop were informed as to what degree of accuracy was required on that particular piece. As a case in point a manufacturer in this district placed an order with an American firm for an automatic machine to be fitted up for making steel bushes. The representative who received the order, not going into the question as to what quality of work was required, sent the model across to the firm, who proceeded to fit up the job in accordance with its usual custom on that class of work. It arranged the machine to accurately turn the outside of the stock, and finish the hole in the center of piece to size, by the use of reamers, and produced work exactly to model. The machine, rigged up with expensive tools and full set of extra tools as well, arrived duly and was put in operation, producing an accurate job. A few days later, the American representative, calling there, noticed that the outside turning tools and the reamers had been removed from the machine, and it was simply performing the operation of drilling and cutting off the bushes. Upon his inquiries as to the cause of the removal of the tools especially made for producing accuracy in the work, the manager of the concern pointed to a row of English hand machines operated by girls, drilling and cutting off the same style of bush, and told him that if he should send work as produced on the automatic, dead to size, along with the work from the other machines, to his customers, they would reject all the bushes made on the old machines. In other words, the machine as arranged did too good work for him, and the cost of getting out the special tools might as well have been saved, had the representative been informed as to what sort of a job was wanted.

"And not only would the cost of these special tools have been saved, had the question of the degree of accuracy required been investigated by the salesman, but the machine could have been fitted up much more quickly, and considerable time in the delivery to the purchaser gained. In this case, time meant money certainly, as he could dispose of all the work he could turn out, and every day's delay in the delivery of the machine to him meant a considerable loss. Furthermore, the machine could have been arranged in the fitting up of the tools to have produced a very much greater output per hour, had it been understood at the home shop that the operations of forming and reaming could have been dispensed with. This shows that the representative would certainly not have been wasting time if he had taken the trouble to inquire thoroughly into all details regarding the use to which the machine was to be put.

American Lathes too Light.

"American makes of regular machine tools, such as lathes, milling machines, drills, etc., are used considerably in this district, and more of them can be sold. While we are in the habit of calling the Englishman conservative in his manufacturing methods, as well as in other things, we certainly are open to the same criticism in regard to certain customs in the building of machine tools. Take, for instance, the lathe as built by many of the American tool builders. Its lines are graceful, it is considered strong enough for any work it will take in, and the various hand wheels, knobs and levers to be manipulated by the operator are conveniently arranged. Most of the builders, however, who have studied English likes and dislikes in machine tools know that a great many engineers on this side believe the American lathe to be altogether too light in certain of its details, and, although this criticism has been made for years, all the lathes that come into this country from America that I have seen are on exactly the same lines as those for home service.

"A few pounds more iron put into lathes would not bankrupt the builder, and it would, in many cases, give greater satisfaction to the English customer and might secure for that particular tool a readier sale. English engineers complain of the lightness of lathe carriages as supplied by most American builders, and say that the change gears for screw cutting and reversing gears in headstocks are of too fine a pitch. It is probable that there are not many cases of break-down in American lathes, but where a man is afraid of certain points in a tool he may perhaps be careful about buying very many of them. I believe that the American maker who designs certain features of his lathes specially for the English market will have success, as, owing to the accuracy and general handiness of American lathes, they are well liked, aside from the points mentioned above.

"In one of the best equipped plants which I have seen in this district, which uses both American and English tools, the foreman, in calling my attention to two lathes side by side, one made here and one made in America, said that the American lathe was far superior, in most respects, to the English tool. But, like so many English mechanics, he was afraid of the carriage breakdown. I made him confess that he had never had a lathe carriage breakdown, but he could not get over the feeling that it would happen some time. Although we American mechanics cannot readily understand this feeling, as we delight in lightness of design, still it is a common feeling here, and one which should be taken into account by our tool builders who desire this market.

"All lathes coming here should be fitted with compound rests. While a great many of our makers send their lathes fitted in this way, others do not; yet the compound rest is generally wanted by all purchasers here, and the British workman has become so used to lathes fitted with this style of rest that he is very strongly prejudiced against the lathe which is not supplied with it.

"It is well known that the gap lathe is a popular tool among manufacturers who have not a large enough business to warrant them having both large and small lathes. Just the proportion of gap lathes in use here I don't know, but a large percentage is of this type. It would seem that if some American maker would put a gap lathe in the market here, he would be able to do something with it, provided the price was not too high. If there is such a tool by an American builder in the market now, it cannot have been widely advertised here, as I do not know it."

German Competition.

Consul Halstead has found what American machinery manufacturers who have returned from European trips have already commented on concerning the methods of German machinery makers:

"An American machinery salesman, who has both Continental and English experience, tells me that one firm of German merchants in Germany, who trade as American merchants and sell great quantities of our automatic machinery, has draftsmen who copy the designs and clever arrangement of every American machine which passes through the house. They have no use for these designs at present, but they are collecting at small cost valuable data, and may soon branch out as manufacturers, or they can sell them at a high figure to some manufacturer. Many German-Americans are doing effective work in Germany, and many native born Americans are employed as foremen in German factories; but I should add, for the benefit of those who should think of attempting the same thing, that it will not be a happy life, and that contracts do not count when the manufacturer has no further use for a squeezed-out sponge. An American salesman who has sold automatic machinery to German manufacturing concerns(and these American machinery salesmen are also, almost invariably, expert machinists) frequently finds that these machines never work in a German factory in a sufficiently satisfactory manner for payment to be made until he has given about three months of his expert attention. He then realizes that, incidentally, he has given valuable points for the whole establishment, on which the German purchaser has been calculating. But while American automatic machinery made in Germany, largely under supervision of American foremen, has been extensively sold, because of low price, in the Birmingham consular district, it has not proved satisfactory, and American machinery is preferred."

JEFFREY TRAVELING FREIGHT CARRIER.

The illustration has for its subject the Jeffrey traveling platform freight carrier, as used for carrying freight of all kinds, but especially for loading and unloading vessels and cars. The carrier consists of two endless steel chains covered continually with heavy oak planks, lined with steel. Axles and truck wheels are provided at frequent intervals which travel on a suitable track being made a part of the angle iron frame, thus making a complete and self-contained arrangement pivoted at one end and provided with a hoisting mechanism at the other, adapting itself to almost any height.

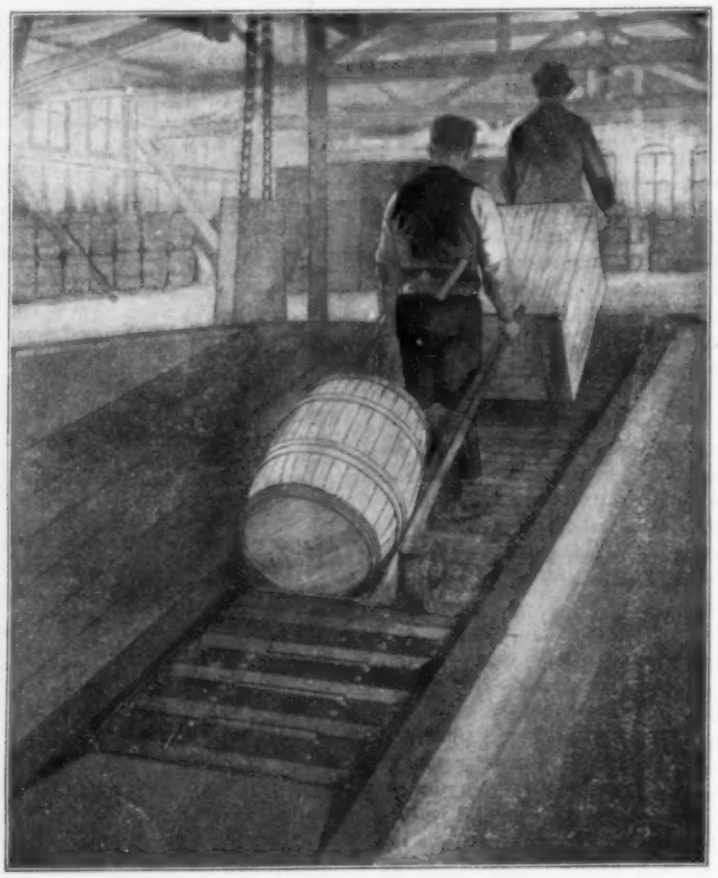
The freight is handled either by pushing it on to the carrier at one end and taking it off at the other, or by men walking on to it with the trucks, as shown in the illustration. The face of the apron is so constructed that it will hold the trucks at any point, also give a good foot-hold to the men when running at quite a steep inclination. The carrier is constructed of best material in a substantial manner, insuring safety as well as durability. The Jeffrey Mfg. Co., of Columbus, O., is prepared to furnish these carriers of a variety of sizes and lengths and will furnish estimates on submitted requirements.

AMERICAN SPACE AT PARIS.

Ferdinand W. Peck, Commissioner General, has secured an increase in space of over 222,000 square feet for the United States at the Paris Exposition of 1900. This is a gain of over 50 per cent beyond the allotment to this country announced as final by M. Picard, the French Commissioner-General. Commissioner Peck had to fight for it. He went to Paris for the express purpose of securing more space for America, and, in true Yankee style, he got it. As the Paris newspapers said of Mr. Peck: "He has a very American way of doing things."

The total space now assigned to the United States is about 750,000 square feet. This is more than has been allotted to England or Germany, or to any country except Russia. The fact that already intending exhibitors have applied for over 700,000 square feet shows the widespread interest that is being taken in what will be the great inaugural event of the 20th century. So sincere is the interest being manifested in the Paris Exposition by the business men, manufacturers, artists and agriculturists of the United States that Commissioner Peck states it will be absolutely impossible to comply with all the demands for space which are now being received daily. Thus, from a commercial standpoint, it is evident that the Paris Exposition is being keenly appreciated in America.

The fact that Russia has been given more room than any other country would look as though France considers Russia her best friend, and as the United States comes next in room, France must reckon this country as her second best friend. Commissioner-General Peck is to be congratulated on the work he has thus far done. It now only remains for Congress to increase the appropriation for the Exposition to at least $1,000,000, or even $2,000,000, to make the United States foremost of all the nations on the earth at Paris in 1900. Germany has appropriated twice the amount this country has provided, and Russia and England surpass us in the financial backing given their Exposition Commissioners. Congress should act promptly and generously.—[New York Commercial.



JEFFREY TRAVELING FREIGHT CARRIER.

J. M. SWEARINGEN, the referee in the equity case of Gilbert T. Rafferty against Charles Donnelly, B. H Rubie, William P. Snyder, J. P. Brennen, Charles Donnelly, Jr., James Adair and the McClure Coke Co., filed his report at Pittsburg. Rafferty claimed that in 1895 when he was absent from Pennsylvania, the salaries of the officers of the McClure Coke Co. were increased, and a contract made for the transfer of his stock to the H. C. Frick Coke Co. The referee found that Rafferty, having ceased to be a stockholder of the company, cannot now maintain his bill on the grounds of fraud alleged to have been committed while he was a stockholder. He also finds that in the settlement of the affairs of the company Rafferty received $124,446 cash and $730,000 in notes for his interest, and under the evidence the referee finds that the plaintiff has not proved his charge that the defendants concealed from him the appropriation of $50,000 for past salaries for certain officials of the company. The costs were assessed, one-third on Rafferty and the balance on Donnelly, Rubie and Adair, who received the increased salaries.

THE United States Mitis Co. has brought suit against the Franklin Steel Casting Co., Franklin, Pa., charging infringement of patent.

MANUAL TRAINING SCHOOLS AND THE SHOP.

The time was when the boards of education in our large cities considered training boys in public schools for industrial pursuits a fad, and were slow in making appropriations for manual training. Many contended that it would be detrimental to a boy's education—that he would be less inclined to apply himself to his studies—in fact, it was said it would "break a boy all up" for study in the class room. The opposite opinion now obtains, for instead of two hours a day in the shop interfering with a boy's studies, it has proved a help rather than a hindrance, and to-day in the cities of New York, Chicago and elsewhere manual training is not only thought to be in its right place, associated as it is with high school studies, but it has found its way into the grammar schools also. Of course, in the latter it is of a very elementary character (working wood only), but the boy is better prepared for the high or manual training school when he enters it. Boards of education have been generous of late years in their appropriations to manual training, especially in the city of Chicago.

Notwithstanding there is much good being done in this way for the youth of America, there is room for improvement in teaching the mechanical arts. It is not sufficient that the teacher be a good workman himself, knowing all the best and latest shop practice, but that he should know the best method to impart the knowledge he possesses. This is very important. It is hard to say which of the two evils is the greatest—the teacher who cannot teach, because he cannot himself work, or the teacher who can work, but who cannot teach.

The best exercises are not always those that look best when finished, and much of the object of manual training in schools is lost owing to the desire to make a showy exhibit of work at the end of the year. For instance, a boy makes something that is admired for its appearance, yet the making of it might not have given the instruction and training necessary to the development of skill that something less attractive would have given. A favorite wood turning exercise is to select several different kinds of wood, and after glueing them together turn some fancy article and daub it over with varnish to make it shine. To the uninitiated this may appear to show excellent workmanship, while possessing little value from an educational standpoint.

In bench work a plain piece of cabinet work gives a boy some idea of construction, but in this kind of work, also, many instructors, for the sake of effect more than instruction, aim to produce something very ornamental and go as far as to add brass trimmings and other frills. In the foundry there is the same danger of allowing the boys to amuse themselves molding and casting ornamental work, which does not give them much idea of foundry practice. A common exercise in the blacksmithing shop is a lamp stand, mostly made up of scroll work bent from light iron by round-nose pliers or tongs. Such a piece of work has its value, but does not teach the art of blacksmithing. Work done in the machine shop is not so much in the form of amusement, owing to the conditions, for when a boy works a drill press, slide rest lathe, planer, shaper or any other machine, he is getting the same kind of practice that he would in a manufacturing concern, and if the piece of work he is doing is not clamped or set in the machine as it should be, the machine will soon inform him of the fact. In the machine shop, having to do with automatic attachments on machines, and to work to fine measurements, boys learn to be careful, which is the first essential to becoming a good mechanic.

The exercises that will develop a mechanical skill, and which also have some market value, are those least desired by the boy, as such are the least interesting. To design or choose exercises that shall be both interesting and instructive is the teacher's problem. The making of ornamental things has its value, in that it is a relief from the regular exercise work, for the ordinary boy will work with more interest on some pretty object that he is to take home, anticipating, as he works, the praises of ma and pa. But he should be given to understand that it is much more important to be able to plane a piece of wood straight and square, to make a good half lap joint, to turn beads and hollows regularly and in the right manner, than to make a fancy box or stool and cover up the bad joints with shellac, glue or silver mountings.

In view of the fact that a large number of manual training school boys after graduating find their way into manufacturing plants, especially those building machinery, it seems that pattern making, the most imporatant branch in the wood working department, is often put in the background. Pattern making should be put more to the front, so that a boy can see the use, and find out the quality of his work in the foundry To teach a boy to make, say, a pattern and corebox of a small gate or globe valve, or any simple piece of machinery having some core work about it, is training him to do that which will be closely related to his future practice. Such work, however, would in all probability be scarcely noticed on the regular exhibition day of students' work. Again, foundry work and pattern making, being sister arts, should be more closely connected and instruction given in both branches the same year. Pattern making is not considered a wood working trade in the same light that carpentry, cabinet making, wood carving and others are, for the reason that patterns to mold and make castings from are regarded more as tools, used to make something with, rather than things to look at and admire for their beauty. For this reason pattern making might be separated from the first year's wood work, and made a companion to foundry practice in the second year.—[P. S. Dingey, in Machinery.

Blast Furnace Gases in Gas Engines.

The use of the blast furnace gases for the production of power through the gas engine is again brought forward by a report submitted to the South Staffordshire Institute of Iron and Steel Works managers in England, on the experiments made at the works of the Glasgow Iron Co., at Wishaw. Perhaps the most interesting result there was the remarkable steadiness of the power obtained, showing of how little importance is the objection offered that the variable composition of gases from the furnace would be a serious drawback. At Wishaw there was no trouble whatever from this cause, and the diagram showing the efficiency of the engine is a more even one than is often seen, either with gas or steam engines. The results as worked out show that where the gas from the furnaces was used to heat boilers, the production of one horse-power per hour required from 600 to 700 cubic feet of gas; while with the gas engine from 100 to 150 cubic feet proved sufficient. The difference is a striking one. In connection with this report the suggestion is made that in many cases there might be a surplus of power, which could be used to furnish electric light or power to parties outside the furnace plant itself. This idea has already been taken up in Germany, where a plant is now beinge rected at the Phoenix-Huette in Borbeck. This includes an engine of 150 h. p., which will be run by gas from the blast furnaces, and will drive the dynamos to furnish electricity for the manufacture of calcium carbide. The further experience goes in this direction the more it should impress furnace owners with the importance of utilizing the power which is now going to waste or is employed only in an inefficient way. The possible saving is entirely too great to be neglected.—[Engineering and Mining Journal.

Notices have been sent out of the change in the style of the Riter-Conley company, of Pittsburg, the Riter-Conley Mfg. Co. having been incorporated under the laws of New Jersey, with capital stock of $750,000. The officers are: President, Thomas B. Riter; Vice-President, William C. Coffin; Secretary-Treasurer, John S. Craig; General Manager, Robert A. McKean. James M. Riter, a brother of Thos. B. Riter, founded the business in 1860. Now, 30,000 tons of plates and structural material is handled in a year, and the construction and erection forces number 1,200 men. Two large plants are maintained, one for heavy plate, tank and boiler work and the other for structural and gas holder work.

The S. C. Forsaith Machine Co., Manchester, N. H., has been declared insolvent and the receivership discontinued. The court found liabilities of $192.000. The company was incorporated in 1884 with capital of $275,000.

The Page Wire Fence Co., Adrian, Mich., recently shipped 30 cars of wire fencing to Nebraska.

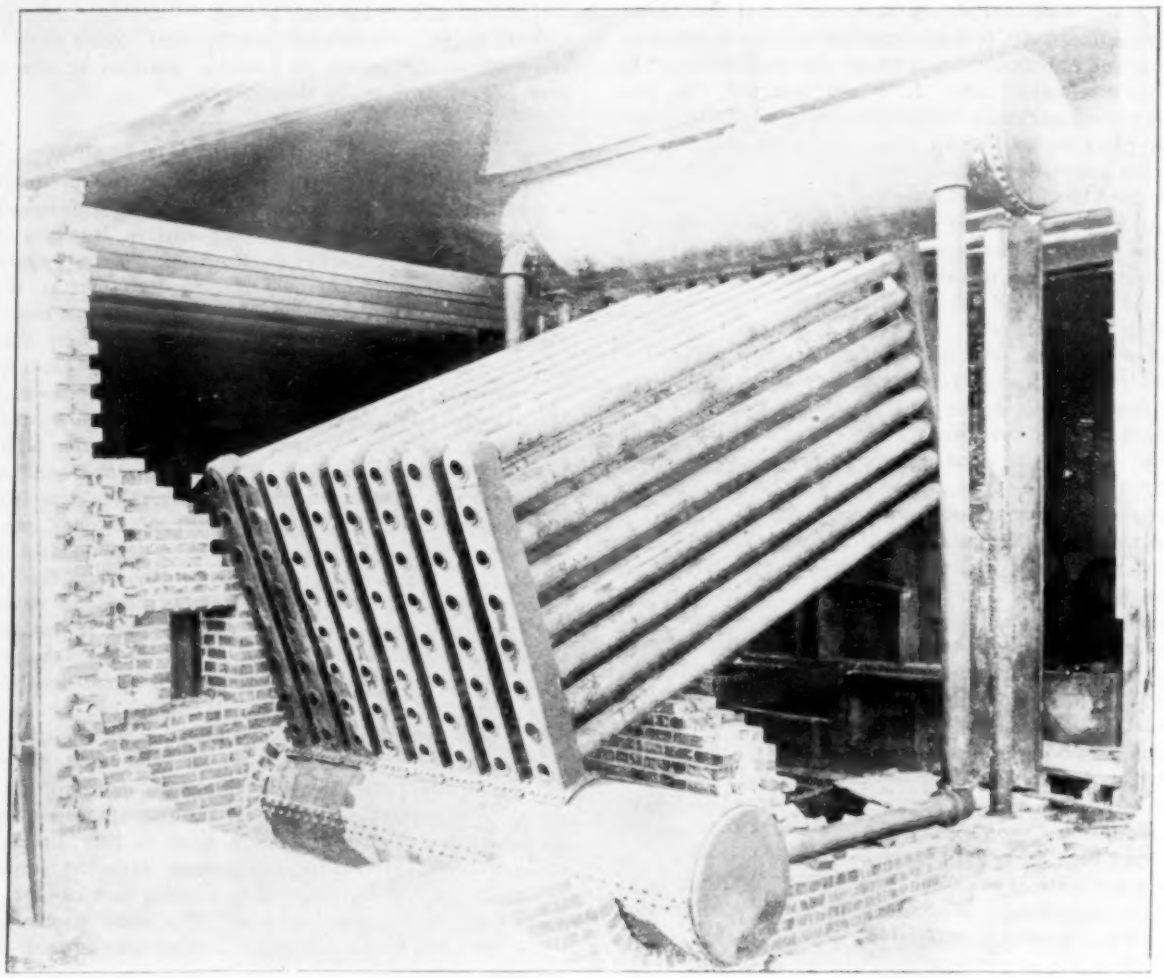
HOWLAND WATER- AND FIRE-TUBE BOILER.

A boiler combining the features of the water-tube and fire-tube constructions is the invention of A. E. Howland, of Grand Rapids, Mich., and is manufactured by the Adolph Leitelt Iron Works, of that city. The material is entirely steel and there are no flat surfaces large enough to require stay bolts or braces. The plan of construction is such that a high pressure of steam may be carried with safety; no riveted, threaded or packed joints are employed, and there are no small hand-holes. The rear or lower drum is set on cast iron saddles, over a foundation plate. Between the saddles and the plate, rollers are placed, so as to allow a free movement of the drum during expansion or contraction of the boiler. The headers over the lower drum and under the upper drum are made from best flowed cast steel and are subjected to a pressure of 500 lbs. to the square inch before riveted to the drums. The tubes between these headers are placed at an angle of 20 degrees, and are expanded in the headers as is done in the common tubular boilers, with no threaded or packed joints to come in contact with the fire. The tubes are in tiers, each tier having its own header to connect with the steam and water drums. The ends of the outside or water tubes, five inches in diameter, are expanded in the inner sides of the front and rear headers, and the inside or fire tubes, three inches in diameter, run through and are expanded on the outer sides of both headers. Free access can be had through the front doors of the boilers and without opening the arch doors for the cleaning, either by scraper or blower, of the outside of the water tube or the inside of the fire tube. Any one of these tubes can be taken out, without touching any other. All are of standard sizes and straight. One man-hole, 10x16 inches, is in each drum for access in cleaning or repairs.

The makers have adopted the dry pipe system in the construction of the steam drum, i.e., a large pipe running lengthwise at the top of the steam drum, closed at one end and perforated at the top, thus taking the steam in a downward course and avoiding all causes of priming or unsteady water line.

In operating a Howland boiler a free circulation is provided for by the use of independent circulating tubes, five inches in diameter, connecting the upper and lower drums. These circulating tubes are outside of the brick work, protected by asbestos covering, and the feed water necessary is forced into one of them at a suitable distance from the lower drum, so that even should cold water be used it is thoroughly mixed with the hot water traveling in the tube, before entering the boiler. The circulating tubes take the water from the water level in the steam drum, and thus there is skimmed off and carried along any impurities which have been separated; and as the entrance into the lower drum is below the fire and into comparatively quiet water, all such impurities are deposited in the bottom of this lower drum, where they can be blown out in the usual manner, or reached at any time through the man-hole.

The placing of the drums crosswise of the boiler and the headers at each end independent of each other and connected only by the straight fire and water tubes, all of the same diameter and length, and when filled with water, all at the same temperature, while free expansion and contraction are provided for, insure against weakening or opening of joints.



HOWLAND WATER-TUBE AND FIRE-TUBE BOILER.

The unusually large fire surface, when compared with the balance of water, is a prime feature of this boiler; and the manner in which the gases of combustion after passing up among the flues in the usual manner to the crown of the arch, are forced to travel back and down to the rear of the boiler, thence through the 3-inch flues, before wasting in the stack, is claimed to be more economical than the use of economizers, flue heaters, or any other device to abstract what is generally waste heat.

The greatest amount of steam is made in this boiler near the steam drum and the angle at which the flues are set and the large openings from the independent headers into the steam drum, enable it to pass up into the drum unobstructed. There are no small necks or flues, but each section delivers its product without friction, and there can be no surfaces where water is driven away by large quantities of steam passing through small openings.

The circulation is positive and the water space between the tubes is kept well cleaned. The water line in the upper drum is constant and steam is practically dry. It is stated that a record has been made of 130 lbs. of steam raised from cold water in 35 minutes. Details of a test of three hours conducted at Allegan, Mich., are given. Pocahontas run of mine coal was used, 780 lbs. being fired which gave 723 lbs. of combustible. The temperature of feed water was 196.6 degrees; of gases to the stack, 450 degrees. Square feet of heating surface, 1,352; of grate surface, 27. The evaporation from actual temperature and pressures, 118 cu. ft., was 7,375 lbs.; from and at 212 degrees, 7,788 lbs. Evaporation per square ft. of grate surface per hour, 91.049 lbs and 96.148 lbs., respectively; per square ft. of heating surface per hour, 1.817 lbs. and 1.92 lbs., respectively. The evaporation per lb. of combustible from actual temperature and pressures was 10.3 lbs.; from and at 212 degrees, 10.77 lbs. The builder's rating was 135 h. p. On the basis of steam at 70 lbs. and feed at 100 degrees the horse power was 75.24.

Steel Manufacture in the South.

Writing in the *Tradesman* concerning the plant of the Alabama Steel & Ship Building Co., now under construction at Ensley, Ala., and commenting on the new year's outlook for exports, A. M. Shook, vice-president of the Tennessee Coal, Iron & Railroad Co., says:

"The furnaces from which the supply of pig iron is drawn are situated within 1,500 feet of the plant, and liquid metal will be delivered direct from the blast furnaces to the steel furnaces. While the question of markets at one time was an unsettled problem, to-day it is an assured fact. The entire output of the plant is practically sold before the foundations have been completed, and other industries that work this character of metal are seeking locations here. The wonderful growth of the export trade for pig iron products idicates that the product of two such mills could easily be marketed. The geographical position is such that its products can be marketed in the south, west and southwest and the Atlantic Coast cities, in competition with other mills in this country. Its export business will be handled at a less rate of freight from point of production to point of consumption than from any plant in the United States, except the one at Sparrow's Point. The distance to tide water, measured by the cost, is $1.50 per ton less than from the Pittsburg district. During the cotton season the water rates are much less from Gulf and South Atlantic ports than from any others, for the reason that while cotton gives bulk, it does not give weight, and iron and steel furnish the best obtainable freight for ballast.

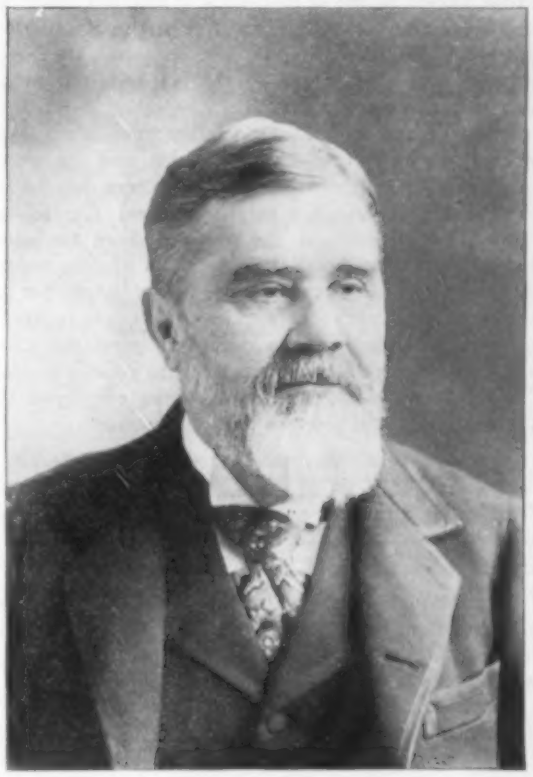
"As evidence of the growth of the export trade, it is only necessary to refer to the fact that 1893 was the first year in which our exports exceeded our imports, and in 1898 it is estimated that the exports will reach more than $100,000,000. This fact, taken in connection with the improved conditions that now exist in this country, accounts for our ability to show that, notwithstanding the production of pig iron in the United States this year will reach the enormous total of 11,750,000 gross tons, which is more than 2,000,000 tons larger than the largest previous year, the stocks of pig iron are much lower than they were on the first day of January, 1898. That production and consumption will not only keep up but will increase, so long as present conditions exist, is shown by the relative production and consumption in the other two great pig iron producing countries, towit, Great Britain and Germany. The estimate for the production in Great Britain for this year is 8,800,000 tons, or less than 100,000 tons' increase over 1897; while stocks have gone down from 3,000,000 tons to less than 500,000 tons in the last 10 years. The estimate for Germany for this year is 7,200,000 metric tons, being an increase over last year of about 300,000 metric tons, with stocks going down. The markets for 1899 seem to be sure, not only for this country, but also for Great Britain and Germany. The great activity in shipbuilding and the very large amount of money that will be distributed in increasing the navies of these countries will be reflected in all other lines of business, and will necessarily make the consumption even greater in 1898."

A NUMBER of manufacturers of corrugated sheet iron held a meeting at the Lincoln, Pittsburg, last week, to make some changes in the arrangement of the price schedule.

OBITUARY.

C. W. Cadwallader, a pioneer in the tin plate business at Pittsburg, died Dec. 30, aged 50. He had been connected for many years with Hamilton & Co., whose tin plate plants were at Hazelwood and West Newton. The company originally made tin ware exclusively but later went into the manufacture of tin plate.

The funeral of W. Dewees Wood, the well-known head of the W. Dewees Wood Co., whose death was noted last week, was held at the family residence in Pittsburg, Friday, Jan. 6. Among the floral emblems was a large broken column from the employes of the plant at McKeesport. Over 300 employes of the works went in a special train to pay a last tribute to their employer.



W. DEWEES WOOD.

We mentioned recently the disability of Philip H. Moore, editor of *The Ohio Valley Manufacturer*, Wheeling, W. Va., from a stroke of paralysis; and regret to learn that after several weeks the illness resulted fatally on Dec. 27. Col. Moore was a writer of more than ordinary ability, who had devoted many years to editorial work in behalf of the iron and steel industries of the Ohio Valley. He was born in 1837. After the war, in which he served in the 36th Virginia Infantry, he entered the employ of the Belmont Iron Works, in which he was a stockholder. He established the *Ohio Valley Manufacturer* in 1887.

Norman A. Williams, of Chicago, died Jan. 8 at his residence, in that city, aged 77. He was the founder of the N. A. Williams Co., dealer in sewer pipe, brick, and building materials, and was president of the company. Mr. Williams was born in Auburn, N. Y., on July 1, 1821. While a young man his parents moved to Cleveland, O., where he made experiments with vitrified clay. In the manufacture of sewer pipe of this material he was a pioneer. In 1851 he formed a partnership with W. P. Southworth, which lasted until he went to Chicago in 1869. A widow and one son, Martin D. Williams vice president and manager of the Williams Company, survive him.

THE Chicago office and warehouse of Howe, Brown & Co., manufacturers of Howe's special tool steel, high grade plate steel, plow and agricultural steel and crucible spring steel, has been removed to 201 to 203 East Lake St., where larger and better quarters have been secured. The already large stock of steel kept at the Chicago branch has been increased by the addition of a large number of new sizes. The manager of the Chicago office is Frank C. Lewis.

TEN YEARS OF THE GERMAN IRON TRADE.

Within the past few days the German government and the *Verein Deutscher Eisen-und Stahlindustrieller* have published the statistics of the production of iron and steel in Germany during the year 1897 and in the previous nine years. The statistics are very valuable and complete, and they show a rate of progress in the development of the resources of that country that had previously been unapproached, and is not yet equalled, by the advances made in any other European country. Within the last 10 years the German production of iron ores has advanced from about 10½ to 15½ million tons; of pig iron, from 4.3 to 6.8 million tons, and of manufactured steel, from 1.2 to 3.8 million tons.

One of the most singular features of this progress is the fact that, except in one or two cases, it has not been accompanied by any corresponding increase in the number of producing establishments. In the last 10 years, the number of steel works has risen from 101 to 164, and the number of foundries from 1 099 to 1,216. On the other hand, however, the number of iron ore mines has fallen from 663 to 586, the number of pig iron works from 111 to 109, and the number of finished iron works from 270 to 186. There has, of course, been an enormous advance in the general dimensions and average productiveness of the great bulk of the establishments in all the categories named. This applies more especially to pig iron works, the average yearly output per furnace having within 10 years increased from less than 19,000 to over 25,000 tons, and the average output of steel per converter and per open-hearth furnace has likewise greatly improved.

The variations in the numbers of works employed in each of the years 1888 and 1897 are thus summarized:

	1888.	1897.
Iron-ore mines	663	586
Pig-iron works	111	109
Blast-furnaces	271	273
" in blast	211	242
Foundries	1,099	1,216
Finished ironworks	270	186
Steelworks	101	164

The enormous increase of productiveness in all mines and works, excepting only the works engaged in the decaying industry of finished iron, has naturally been attended with a great advance in the number of hands employed in the different branches of the trade. The total recorded increase in the 10 years has been 185,082, including coal mines and iron ore mines and workings. In iron and steel works and foundries alone the increase has been 72,380, the most important individual item being an increase of about 50,000 in the number employed in the steel works. This increase is less than might be expected in view of the advance in the quantities produced. The total number of hands employed in different departments of the German coal, iron, and steel industries in 1888 and in 1897 are tabulated below:

Industry.	1888.	1897.
Iron ores	36,009	37,991
Bituminous coal	225,452	336,174
Pig-iron	23,046	30,459
Manufactured iron	51,779	39,958
Steel	41,256	91,526
Foundry castings	53,326	78,844
Totals	430,870	615,952

The next table is one of very unusual importance. It shows the quantities of different descriptions of iron and steel made in Germany in the years 1888 and 1897. This has been by far the most progressive period in the history of German industry, and the German metallurgical progress in these 10 years can hardly be rivalled elsewhere, except in one or two cases of American leaps and bounds. The broad general result set forth is that in the interval named the output of finished iron has declined from 1,558,797 tons to 1,031,691 tons, concurrently with an increase in the production of steel from 1,298,574 to 3.863,496 tons. In the latter category, the largest individual item of increase appears under the heading of merchant iron and steel—an advance from 191,581 to 1,554,995 tons, and the next largest is an advance from 140,564 to 574,097 tons in sheets and plates. This last advance is ominous for the future. Clyde and North of England steel manufacturers have hitherto supplied the greater part of the plates and angles used in German ship yards. With these figures before us, he would be a sanguine man indeed who would look for a continuance of this trade in British hands. The great advances made in the production of wire—over 100,000 tons—and rails will also be remarked, but these branches are being so much cut into by American houses that their future is very uncertain.—[London Iron and Coal Trades Review.

PRODUCTION OF FINISHED IRON AND STEEL IN GERMANY IN 1888 AND 1897, IN METRICAL TONS.

DESCRIPTION.	FINISHED IRON.		FINISHED STEEL.	
	1888.	1897.	1888.	1897.
	Tons.	Tons.	Tons.	Tons.
Rails and fastenings	21,324	6,511	435,189	792,610
Iron sleepers, etc	21,581	509	191,981	144,333
Axles, tires, and wheels	8,200	13,348	80,742	126,979
Merchant iron and steel	1,036,266	793,588	191,581	1,554,995
Plates and sheets	239,416	109,591	140,564	574,097
Tinplates	584	.....	17,647	31,458
Wire	176,310	34 073	235,059	478,834
Tubes, etc	20,026	37,735	8,589	26,953
Other descriptions	35,090	36,336	87,222	133,210
Totals	1,558,797	1,031,691	1,298,574	3,863,469

Advance on Plates and Sheets.

A Chicago jobbing house, which deals particularly with consumers of plates and heavy sheets sent out a letter Dec. 30, withdrawing all quotations. We make this extract: "We are compelled to do this in sympathy with the manufacturers who, in the face of higher prices for raw materials, congested order books, and a tremendous demand (and at the season when everything should be lower), have refused to enter additional contracts except for a limited amount, deferred deliveries, and at considerably higher prices. This condition has most seriously affected heavy plates, (¼-inch thick and heavier), where the advance is from $2 to $4 per ton. This increase will affect sheet steel all the way down the lighter numbers. No manufacturer or merchant is making a profit on galvanized sheets at the present time, and this, too, will share the improved condition. Deliveries on heavy plates are from four to six weeks, though a little better can be done on lighter sheets. As the mills are changing their prices so rapidly, it is impossible for us to issue a general quotation sheet, so we should be pleased to quote on any inquiry. In view of the general prosperity affecting nearly every line of business, it is reasonable to assume that the start from the low level in iron and steel will progress steadily forward, and that the little spurt of 1895 will be reproduced during the coming summer in a great wave of prosperity, with advancing prices for all forms of iron and steel, as in the "boom" of 1879 and 1880."

American Trade Index for Foreign Buyers.

The National Association of Manufacturers is now carrying out plans for placing in the hands of the principal merchants in foreign countries detailed information concerning the leading manufacturers in the United States who are interested in foreign trade. This information embraces the names and addresses of manufacturers, the lines of goods they make which are adapted to exporting, the foreign agents of the manufacturers, the registered cable addresses and the telegraphic cypher codes that are in use. The arrangement of the book is such that a merchant who desires to ascertain, for example, the names of principal manufacturers of axes in the United States, can turn to this heading in the directory and at once find the names of the largest makers in this line; should a buyer desire to open communication with the principal makers of stoves, either for gas, coal, oil or wood, the desired names could be ascertained immediately from the Index. It forms a volume of 350 pages, strongly bound in cloth. The first edition consists of 5,000 copies in the English language, which is being distributed free of cost to the principal merchants in the English-speaking countries. The price in the United States is $3. The preparation of a similar edition in Spanish is already in progress, and this edition will be distributed in Cuba, Puerto Rico, the Philippines, and those countries where the Spanish language is most in use. Other editions in different languages will follow. The work of preparing and distributing the various editions of "American Trade Index" is being carried on in the general offices of the National Association of Manufacturers, the Bourse, Philadelphia.

The Salem Improvement Co., Salem, Va., has sold its 48 per cent in the stock of the Salem Furnace to an interest which has acquired the balance of the stock. It is believed the furnace will be started again.

ECONOMIES IN THE USE OF COMPRESSD AIR.*

BY R. P. WHITELAW.

(Concluded from Dec. 29.)

I think it would be unfair of me to conclude my paper without touching on reheating, which is a very important factor in the use of compressed air. It is argued by many prominent engineers that the reheating of air for use in rock drills is a very difficult matter. More difficult problems than this have presented themselves to the engineering world and have been mastered, so also will the reheating of air for use in rock drills. Air at a low temperature has very little cooling effect upon water or other bodies it comes in contact with. The application of this, inversely applied, is of great advantage in the use of compressed air for the transmission of power, or, in other words, it requires but very little heat to raise the temperature rapidly; in fact, there is no other source of energy to which heat can be applied with the same economical results.

It is well known that after the transmission of compressed air to the point where it is to be employed, a considerable saving of cost can be effected by reheating immediately before using. It can be easily shown that where air has been compressed to a certain pressure, and has by transmission to any reasonable distance been reduced to its normal temperature, if the air is reheated and expanded the extra volume resulting from the expansion is produced by an expenditure of heat much less than the original volume was produced for. Let us assume, then, for the sake of easy computation, that air is being compressed to 75 lb. by steam at the same pressure, and that two cubic feet of steam are required for the production of one cubic foot of air. The weight of one cubic foot of steam at 75 lb. is 0.208 lb., and the total units of heat in one lb. of steam at 75 lb. are 1,151; therefore the total units of heat in one cubic foot of steam are, in round numbers, 239. To produce one cubic foot of air at 75 lb. 239 by 2 B. T. U., or 478 B. T. U. will be required. As air at constant pressure expands or contracts at its absolute temperature, it is easy to show the quantity of heat required to double the volume of air at any temperature. We will again assume that we have got one cubic foot of air at 75-lb. pressure and at 60 degrees Fahr., or an absolute temperature of 521 degrees. To double the volume we require to double the absolute temperature or 521 by 21,042; deducting 461 from this would leave the temperature by thermometric measurement to be 581 degrees, showing an increase of temperature of 581-60, or 521 degrees Fahr. The specific heat of air at a constant pressure is 0.237, or nearly a quarter of the specific heat of water. The weight of one cubic foot of air at 75-lb. pressure is 0.456 lb.; the actual heat expended, then, in doubling the original cubic foot of air at 60 degrees Fahr. is 521, the temperature by 0.237, the specific heat by 0.457, the weight in pounds—or 56.3 B. T. U., or, as nearly as possible, 12 per cent of what it took in heat units to produce it in the first instance. Of course, we cannot expect to get a reheater that will give the full heat value of the coal, but it is quite reasonable to expect at least 70 per cent efficiency from the coal, which can be easily got from a good steam boiler with suitable coal. This would work out at 20 per cent of the original cost of the air to exactly double the volume—such a result as this could not be got at in actual practice. The temperature—viz., 581 degrees Fahr.—is too high, and, again, it is not possible to produce air at 60 degrees Fahr. without such a series of staging and intercooling that it would make the process of air compression too difficult. Any how, with two-stage air compression air can be produced at 280 degrees Fahr. Suppose it is then reduced to 60 degrees Fahr. by transmission and storage, the loss incurred is 30 per cent, due to contraction in volume. We would, therefore, require 50 per cent of the original heat units to double the volume of the air. I do not mean to say that even such a good result as that could be obtained, but I do say this, that it is the duty of all engineers to do their utmost to endeavor to get as near to it as possible and raise to its proper level the most natural source of energy that exists in nature.

The reheating of air also makes it possible to use it expansively without fear of freezing up the exhaust ports; in fact, the temperature could be regulated to suit any reasonable cut off, so that the temperature would not fall below 32 degrees Fahr. without reheating. With dry air two expansions are all that can be got, while with reheated air it is possible to get five and six expansions, more so if the air is well saturated. Reheating with steam has been used with very good results, and where found convenient, steam should be always used with air. Suppose a steam reheater was used for a pump within a reasonable distance from where a rock drill was being used, and the condensed steam was trapped, the trapped water could be let into a launder lying nearly level, so that the water would fill the launder. The air pipe leading to the drills is then immersed in the water, which would have a temperature of probably 140 degrees Fahr. The air would have the same temperature as the water. Suppose it was only 100 degrees Fahr. when delivered at the drills, it would always give a little help towards economy.

In the matter of economy, both in generating and in distributing compressed air, if proper care is exercised so that the machine is as nearly perfect as can be, the receivers and the pipe main perfectly free from leakages, with only one safety valve, no matter how many receivers there are on the distributing main and that one safety valve fitted with a good strong siren that will make the attendant wish he had been more careful every time it blows off, the transmission of power by compressed air should be at the very least equal to any other method. While compressed air has many disadvantages, it has also many advantages that other sources of energy have not got. For instance, in deep mining, such as we will have in the Rand presently, when depths of 2,000 and 3,000 feet will be quite common, and temperature of between 90 degrees and 100 degrees Fahr., compressed air will gain where electricity would lose. First, the weight of air in the column will add to the pressure, not to a great extent, but probably quite enough to make up for what has been lost in friction; at a depth of 2,000 feet, with air at 80-lb. pressure on the surface, there would be a pressure of something like 87½ lb. in the mine. Then, again, supposing the temperature of the atmosphere was 60 degrees, and the temperature of the mine was 96 degrees, at 3,000 feet the air would be reheated 36 degrees Fahr., showing a gain of about four per cent, the mine itself acting as a reheater. Thus it will be seen that for deep mining, where high temperature may be expected, compressed air will increase in economy, whilst, as I have already endeavored to point out, other sources of energy would keep on losing and regain nothing. Although not yet in economy, yet in many other ways does compressed air appeal to the mechanical engineer; it is perfectly safe, accidents caused by compressed air are so very rare that they are practically unknown. Should an air pipe burst, no harm is done except the loss that is caused by leakage. As a proof of its growing popularity, we have only to take up the advertisement columns of an engineering paper, and we find that the different appliances that are operated by compressed air are simply innumerable. In fact, it would seem that it is just beginning to dawn upon the engineering world that the greatest force in nature is the air we breathe when put into the proper form. And now that the first blush of electricity has worn off, and scientific men are looking for new fields of thought, I think I am safe in predicting that compressed air will come in for a considerable amount of attention, and great developments may be looked for during the next few years.

* Paper read before the Mechanical Engineers' Association of South Africa.

THE estate of P. D. Beckwith, Dowagiac, Mich., has sent out to its friends the "Round Oak Guards' March," composed by Harry Ellsworth Shroff, "in commemoration of the 27th and most successful year" of the Beckwith Round Oak stove.

A paper cutter and letter opener is a holiday souvenir from the Webster, Camp & Lane Machine Co., Akron, O., who manufacture hoisting and winding engines, mining machinery, car dumpers, coal and ore handling machinery and electric hoists and mine locomotives.

Allegheny, Pa., select council has awarded the contract for the new 250 h. p. boiler and stoker for the Howard St. pumping station to William F. Patterson, at $5,298. The contract for mechanical stokers was given to the Playford Stoker Co., of Cleveland.

FORD AND MONCUR HOT-BLAST STOVE.*

BY JOSEPH H. HARRISON.

The subject of stoves in the Middlesbrough district, producing as it does about three-eighths of the total output of pig iron of the United Kingdom, is naturally one of considerable importance, and it is perhaps due to the improvement in this portion of our blast furnace plants, more than any other portion, that we are now able to produce nearly double the quantity of iron per furnace that was possible not so many years ago. In the days of pipe stoves 500 tons of Cleveland iron was considered a very good week's work for a furnace, but now, with improved heating stoves of the regenerative type, we hear of makes of about 900 tons. At the same time, although chiefly by means of this hotter blast we are able to increase the output of iron, I think it is pretty generally admitted that the average quality of the iron is lower, and the average consumption of coke is not reduced to the extent which was anticipated when firebrick stoves were introduced.

The Ford and Moncur patent had almost run through its full term before a single stove of the type was erected in the Middlesbrough district, which was in 1896, and at the present time there are only six at work and three more in progress of erection. A year or two ago, additional stoves being required at the Normanby Iron Works, the author advocated the Ford and Moncur stove, with the result that two were erected, and have done very well. About the same time, Messrs. Samuelson & Co. converted a Cowper into a Ford and Moncur, and later added two more large ones of the same type, and last year a Cowper was converted into a Ford and Moncur at the Cargo Fleet Iron Works. There are now at work in this country altogether about 160 of these stoves, of which about 75 are on the west coast, 52 in Scotland, and the remainder in the various other iron making districts, whilst there are more than double this number of Cowper stoves at work.

The shell and lining of the Ford and Moncur stove is much the same as an ordinary Cowper stove, but the combustion chamber is rectangular, and stretches right across the center of the stove in plan, thus dividing it vertically into a combustion chamber in the center, the upper part of which is subdivided into comparatively small rectangular passages, and a chamber filled with chequer work on either side of it. These two chambers are each again divided in the center by a brick wall, extending from the floor of the stove to the dome, against which it is tightly built. Thus, in plan the stove is divided into four separate compartments, pairs of which directly communicate at the top, and the two pairs also communicate at the lowest point of the small rectangular passages in the combustion chamber.

Below the grids each of the four compartments communicate with the smoke flue under the combustion chamber by means of the rectangular wing valves, each of which can be closed or opened from the outside of the stove by hand wheels and screws. This smoke flue opens into a chimney valve, of the usual type, but having fixed between it and the shell a circular butterfly valve of the same diameter as the chimney valve, but with its spindle slightly out of center, and called the instantaneous valve. There are also four manholes at the bottom, opening under the grids, and one in the center of the dome top, giving access to the inside of the stove when desired. The size of stove which has been chiefly adopted is 72 feet high to top of dome and 26 feet diameter inside of shell, but these sizes have been very much varied.

Gas for combustion enters through the gas valve, and immediately turns up through two openings at the ends of the arch of the short flue into which the gas valve opens, thus splitting it into two portions, each passing into a gas flue formed in the combustion chamber walls, ports into the combustion chamber being arranged across the stove at suitable distances apart. Air for combustion passes in through the air valve, and is led into the two air flues immediately over the gas flues, and these also have ports, at suitable distances apart, entering the combustion chamber. The hot gasses of combustion pass up the combustion chamber, down through the chequer work, which is thus heated up, then through the four open rectangular wing valves, and so to the chimney valve. Cold blast is brought into the smoke flue from the cold-blast valve, and from thence distributed through the four open rectangular wing valves to the four regenerative chambers. The blast is thus heated and passes down the combustion chamber, and out through the hot blast valve near the bottom.

* From a paper read before the Cleveland Institution of Engineers, Middlesbrough, Eng., Dec. 19, 1898.

Features of the Ford and Moncur Stove.

Having now described the construction and working of the stove, I would like to point out what I consider to be the chief points of merit it contains. These are: 1. Proper combustion of gas and air is provided for. 2. The heat of combustion is spread well over the chequer work. 3. The chequer work is in good form. 4. The stove can be kept clean without stopping it, without opening it, and without cost.

With regard to the first claim, it may be observed that the gas and air for combustion are brought in at points some distance apart, and each is at once split up into two separate portions. Each portion of gas and air is then conducted in its own separate flue, right across the full length of the combustion chamber, one pair of flues at each side, the air which is comparatively cold being above, the hotter gas below, and from these flues the gas and air are each admitted into the combustion chamber by a series of por tsor slots, thus forming a number of small streams pretty equally divided over the whole length of the combustion chamber on both sides, so that a very intimate mixture is got before combustion takes place—also the gas and air both flow into the combustion chamber in the same direction, so that one does not impede the other, and the chamber, being very large, gives ample room for the expansion due to combustion.

The broad result of this systematic arrangement for combustion as compared with the crude methods found in other stoves is that for a stove of any given size the Ford and Moncur will use very much less gas to give the same temperature and volume of blast than any other stove.

With regard to the fourth claim, the stove can be kept clean without stopping it, without opening it, and without cost. This is the greatest point of merit in the stove. We all know how much better results can be got from a freshly-cleaned stove than from a dirty one, so that a stove that is always clean must be admitted to be a real advantage. The dust deposited in the stove from the gas is effectually blown out and up the chimney by the cold blast every time the stove is changed from blast to gas, so that dust is not allowed to gather in the stove.

Method of Cleaning.

When a stove comes off blast all the valves are closed, except the cold blast valve and one of the internal wing valves. The chimney valve is then opened to the top (first relieving the pressure in the valve casing by means of a small snifting valve on the top cover) and the cold blast valve closed. The stove is now full of air at blast pressure. The catch securing the instantaneous valve near the chimney valve is suddenly released, and the wing, being hung upon a spindle slightly out of center, flies full open, thus allowing the stove to empty itself through the chimney valve and up the chimney in one blast, carrying with it the dust encountered in its course through the stove. If we close all the internal valves except one, it is quite clear that when the instantaneous valve is opened the whole of the expanding air in the stove will have to pass through that one, and in order to get there the air in the section at the other side of the combustion chamber will have to rise up to the dome, and then rush down the section above the open valve; also, that in the two sections at the other side of the center wall will have to rise to the dome, then rush down the combustion chamber to the bottom of the rectangular passages, turn up again to the dome, and then rush down the same section above the open valve Thus we see the current is upward in three sections, and then their combined force is downward in the fourth section.

Owing to the large size of the instantaneous valve, the stove is emptied almost instantly. This valve is then secured by the catch again, the cold blast valve opened slightly, and the internal valve closed which was open, and the one diametrically opposite opened. By the time this is done the stove will be about full of blast again, but, to make quite sure, the cold blast valve is fully opened, and then closed, and the instantaneous valve again released, thus blowing through the opposite section into the chimney. It will be noticed that the, current

which this time is downward in this particular section, was upward in the previous blow out. This constantly reversing current is most efficient for removing the dust from the chequer work and passages at the top of combustion chamber. The other sections are then blown in the same way, after which the stove is put on to gas. This operation from start to finish can be easily done in four minutes, and is the only time devoted to cleaning from year's end to year's end. There is also a valve opposite the end of each of the gas flues in the combustion chamber walls, and these can be rapidly opened and closed any time when the stove is on blast, thus clearing these flues and their ports of dust.

There are stoves on the west coast still working and giving good heats which have been stopped for repairs only once in the seven years they have been at work, and I believe there are others which have not been stopped for 12 years. When we come to compare this with the usual practice here, it seems like a fairy tale.

In works here it is usual to shoot and clean each stove every week, at a cost in labor of, say 5s., to say nothing of gunpowder, nor the destruction wrought by it on the chequer work, nor of the time and heat lost when the stove is off. Then there is the annual, or bi-annual cleaning, when each stove is laid off, cooled down, top chequers and broken bricks renewed, and heated up again, taking perhaps a fortnight or even more out of the year's work of the stove, to say nothing of the cost of doing the repairs.

The heats obtainable from Cowper and similar stoves gradually go down from the time they are cleaned till the next cleaning time, and it often happens that a furnace may have to work for a time with one very dirty stove and another freshly cleaned, so that a jump of 300 degrees may easily be got when one goes off and the other on, with possibly disastrous results to the furnace.

Of course, I know that Cowper stoves are blown out at the manholes from time to time, but I do not think the results worth consideration, for, beyond clearing every one off his work in the vicinity and dristributing the dust that lay nearest the manhole all over the place where they were working, little is done.

Value of Thorough Cleaning.

In the author's opinion a clean surface on the chequer bricks is of far more importance to the absorbing and giving out of heat than superficial area exposed, for flue dust is a very bad conductor of heat, so much so that at the Creusot Works they have found it to be the very best material for covering steam pipes. A coating (more or less caked) of this material on the chequer bricks will prevent the ready passage of heat which is so essential. At one of the west coast blast furnace works, the manager, Mr. Paterson, in putting up Ford and Moncur stoves, invented an improved system for cleaning them, and which, though perhaps a little more costly, has the advantages of having all the valves outside the stove and of blowing clean through from the cold blast main into the chimney. This system has been most successful in every way, and certainly is a distinct improvement upon the ordinary system of blowing out. At these works they have eight stoves, 72 feet by 26 feet, to work five furnaces. They were put up in 1886, 12 years ago, have been working continually since, and have never been once stopped for cleaning or repairs. This you will agree is a splendid record, particularly as they still give an average temperature of 1,400 degrees Fahr., and can easily get 1,550 degrees when they require it. These good results are chiefly attributed to the very perfect system of blowing out, and so keeping the stoves regularly clean. The stove is practically the same as the other, except that there are no internal valves, and the gas and air inlets are lower, thereby giving increased heating surface in the combustion chamber. There are two chminey valves, each taking two sections of the stove by the two large bends, each having an instantaneous valve attached. These valves are hung centrally, and not out of center like the ordinary Ford and Moncur valve. On each bend, between the stove and the instantaneous valve, is a cold blast connection with valve.

In blowing out this stove the cold blast pressure is kept on all the time. One chimney valve is opened full. Then one of its instantaneous valves is smartly opened wide and closed again (the cold blast stove near it being first closed). Then the other cold blast valve is closed, while the other instantaneous valve is blown smartly. Then the opposite chimney valve is opened and the same operations are gone through on that side, after which the stove is put on to blast. At the next change of this same stove the operation is commenced at the opposite side. In this way not only is the air in the stove expanded and shot up from each of the three sections, but the cold blast follows it up from behind in every case, thus getting a splendid blow, which dislodges any dust that may have gathered the last time the stove was on gas. It may be urged that there is a danger of the engines running away, but there is no trouble at all of this kind, and when you come to think of it there is not likely to be, because there will always be, say, three stoves full of blast, and all the cold and hot blast mains, and it is not possible during the moment that one instantaneous valve is open for the pressure of all that volume of blast to go down sufficiently for the engines to feel it. This cleaning arrangement has, so far, not been worked by any one else, but the three stoves now in progress in this district will be cleaned on this plan. This system, having the valves all outside, is applicable not only to the Ford and Moncur stove, but to the Cowper, the Whitwell, and possibly others; and I see no reason at all why it should not be applied to existing Cowper stoves in this district, and give as good results. The cost of applying it would be very soon repaid in the saving of cleaning, repairs and time, and in better heats giving better furnace working.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants :—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

Wm. H. Saunders, of Hammond, Ind., is reported to be promoting a new tin plate company at Sharon, Pa., with $50,000 capital. The Clark estate has offered a site north of the city.

Joseph H. Hoadley, of New York, confirms the report that the Leiter Syndicate has secured the Rhode Island Locomotive Works, at Providence, R. I., the company operating them under the name of the International Air Power Co. Horseless trucks, operated by compressed air, and compressed air locomotives, will be manufactured, in addition to steam locomotives. The Greene-Wheelock engine will also be manufactured for the European and Canadian trade.

The Water Board, of Detroit, Mich., has ordered estimates for an addition to the water works large enough to admit the installation of three high pressure pumping engines of not less than 24,000,000 gallons each, together with a boiler plant of sufficient capacity to supply these pumping engines.

A charter for the Pittsburg Horse Shoe Co., capital $100,000, has been taken out at Harrisburg, by C. E. Beeson, B. J. Jarrett, W. L. Merwin, F. N. Swartz and H. E. Anderson, but the capitalists behind the scheme are headed by Wallace H. Rowe, president of the Pittsburg Wire Co., and W. C. Reitz, secretary of the Bindley Hardware Co. Negotiations have been entered into for two acres of land near Homestead, and it is expected that within 60 or 90 days a portion of the plant will be in operation. Eight horse shoe machines will be installed and the output will be 180,000 to 200,000 kegs a year. It is stated that the product can be put down in London 50 cents a keg cheaper than English horse-shoes.

The Michigan Iron Works, Grand Rapids, Mich., have been reorganized and will file articles of incorporation. The officers will be: W. T. Powers, president; Fred W. Powers vice-president; J. W. Spooner, secretary treasurer. The capital stock will be $50,000, of which $30,000 is paid in. Shingle mill machinery will be manufactured.

The Kennedy Mfg. Co., Indianapolis, Ind., incorporated a few weeks ago, will manufacture gas meters and a number of other patented specialties. The company will purchase brass and iron castings, brass tubing, a small screw machine and a 24-inch planer.

The Wilmington Tin Plate Co., licensed in Illinois last week, is composed of three Joliet men—Dr. William Dougall, D. Trevor Lewis and T. W. Jenkins. They have secured a tract of 80 acres in Wilmington, near Joliet, and announce that they will erect a tin plate plant to cost $150,000.

At Charleston, W. Va., the West Virginia Steel Co., of Wheeling, was incorporated, Jan. 7, with a capital of $1,000,000. The incorporators are George Hook, W. A. Wilson, George E. Stifel, Charles W. Franzheim and Frank G. Caldwell.

The Automatic Machine & Tool Co., has been incorporated at Chicago, with a capital stock of $3,000, to manufacture tools, novelties and small machinery, by Edward Mikkelson, John Gabel and P. Nissen.

New Construction:—

The Berlin Iron Bridge Co., of East Berlin, Conn., furnishes and erects the steel work for the new Pawtucketville Church at Lowell, Mass. Over the interior auditorium will be placed heavy steel trusses having a clear span supporting the roof framing and ceiling.

The contract for the erection of another sheet mill has been let by the Denison (O.) Rolling Mill Co. to the Shiffler Bridge Co., Pittsburg, Pa. The building will be 50x140 feet, and will be of steel. An order for the necessary furnaces has been placed with Edward E. Erickson, of Pittsburg.

The Youngstown Bridge Co., Youngstown, O., manufacturer of iron and steel bridges, roofs, turntables and structural work, is putting up a large hoop mill building for the Union Iron & Steel Co., of Youngstown, consisting of one part 160 feet wide and 70 feet long, and one part 80 feet wide and 210 feet long. The company is also getting out a building for W. B. Pollock & Co., also of Youngstown, 45x170 feet, and is furnishing considerable structural steel work for the Aschman Steel Casting Co., for the improvement of its plant at Sharon, Pa.

Last week the Pittsburg Reduction Co. took what is probably the largest single order for aluminum ever placed. It is for a Belgium firm, to be made into camp utensils, and for various metal parts in the furnishings for the artillery, infantry and cavalry of certain European armies. The total weight involved is 1,540,000 pounds, to be delivered 120,000 pounds a month throughout the year. The cost will be about $900,000. To take care of the order an addition is being built to the Niagara Falls plant of the company. An order for four generators, to have a total of from 4,000 to 5,000 h. p., has just been let to the Westinghouse Electric & Mfg. Co. The entire improvements will cost about $250,000, increasing the capacity of the plant from 20,000 to 35,000 pounds of aluminum a day.

The Alabama Steel & Wire Co., has placed a contract with the Edward P. Allis Co., of Milwuakee, for two of its rod mill engines, aggregating 4,000 h. p.

A press report says that a steel plant is proposed for Newport News, Va., near the shipyard. The statement that there will be 50 shops, to cost $5,000,000, employing 6,000 men and having an annual output of $54,000,000 is quite too circumstantial to be true. Armor plate is mentioned as one line of manufacture. On the face of it the report is entitled to much doubt.

The Marine Iron Works, Bay City, Mich., are erecting a two story addition.

Spayd Bros., Van Wert, O., are making plans for an addition to their foundry.

The Wilson-Snyder Mfg. Co., Pittsburg, Pa., manufacturer of pumps, is considering the advisability of removing its plant to some location on the Monongahela River, probably near Homestead. If this is done, a considerably larger plant will be built.

The American Steel Foundry Co., of St. Louis, is making an extensive addition to its works at Granite City, Ill. The new casting building will have a central span of 80 feet and wings of 60 feet, the total length being 400 feet. Koken Iron Works, of St. Louis, have the contract.

The American Pipe & Foundry Co., owning and operating cast iron pipe plants at Bessemer, Anniston, and Bridgeport, Ala., and Chattanooga and South Pittsburg, Tenn., has decided to double the capacity of its plant at Bessemer and to remove the general offices from Chattanooga to Birmingham, Ala. The enlargement of the Bessemer plant will be completed by summer.

The Columbiana Boiler Works, Columbus, O., are building an addition to their plant.

The Dominion Radiator Co., of Parkdale, Ont., is purchasing adjoining land for the building of extensive additions.

Fires and Accidents:—

The new nut and bolt works near Greensbury, Pa., burned Jan. 6. Loss, $20,000; partly insured.

Fire damaged building and stock of the Liddell Machine Co., Charlotte, N. C.

The Greensburg (Pa.) Nut & Bolt Works operated by John Robenstein, was destroyed by fire Jan. 6, with loss of $20,000, partly insured.

The Lavelle brass foundry at Anderson, Ind., was badly damaged by fire Jan. 1. Insured.

The six-story building at 44 S. Jefferson st., Chicago, owned by the Barnum & Richardson Mfg. Co., was destroyed by fire last week. The building was occupied by a number of manufacturing concerns, among which were the Chicago Metallic Mfg. Co., and the Bertalsen Adjustable Drill Co. The loss is estimated at $15,000.

A dispatch states that on Dec. 29 fire in Caskey Bros.' foundry, Newport News, Va., did $35,000 damage. Insurance, $12,000.

General Industrial Notes:—

Throughout the year 1898, the Link-Belt Machinery Co., of Chicago, was very busy. It was necessary to run its plant night and day seven months and full time the balance of the year. Representative contracts executed were for the following concerns: Producers' Cotton Oil Co., Yazoo City, Miss., complete power transmission machinery, link-belt elevators, and conveyors for the new plant. Hoosic "B" Elevator, Boston, complete grain elevator machinery; Chicago Virden Coal Co., Virden, Ill., one 100-k. w. dynamo engine, switchboard and eight "link-belt" chain breast mining machines; McCormick Harvesting Machine Co., Chicago, sand handling conveyors for foundry; Tuscaloosa Wadding Co., Tuscaloosa, Ala., wadding elevator; Colorado Fuel & Iron Co., Sopris, Col., large coal conveyor, used in connection with their coal washer; Stineman Coal & Coke Co., South Forke, Pa., engine, 100-k. w. dynamo, switchboard, and 10-ton 80 h. p. locomotive; Mandell Bros., Chicago, merchandise elevator extending eight floors; National Malleable Castings Co., Chicago, sand handling conveyors; Clearfield Coal Co., Tyler, Pa., one 150 k. w. dynamo, two 60 h. p. locomotives, switchboard, and three low "link-belt" mining machines; Albert Schwill Malting Co., Chicago, conveyors for handling coal into storage room and from latter to boilers; Chicago City Railway Co., Chicago, coal elevator; Summit Coal Co., Linton, Ind., boiler, engine, 100-k. w. multipolar dynamo, switchboard, and one "link-belt" mining machine; Coxe Bros. & Co., Chicago, electric coal scrapers; Consolidated Coal Co., St. Louis, one 100-k. w. dynamo, switchboard, and one 10-ton 26 gauge locomotive; Northwestern Gas & Coke Co., Chicago, complete system of hog conveyors; University of Illinois, Champaign, Ill., coal and ashes handling machinery; Patton Coal Co., Patton, Pa., one 100-k. w. dynamo, engine, and 10 "link-belt" mining machines; Julius Knack, Detroit, Mich., retail coal pocket conveyors; Morrisdale Coal Co., Morrisdale Mines, Pa., engine, 100-k. w. dynamo, 10-ton 80-h. p. locomotive; American Glucose Sugar Refining Co., Waukegan, Ill., char filters; Chase Elevator Co., Chicago, machinery for Chicago & Grand Trunk Ry.; grain elevators, Elsdon station; Wisconsin Grass Twine Co., St. Paul, conveyor for handling hay; Deering Harvester Co., Chicago, sand elevator; Frankfort Chair Co., Joliet, Ill., rope drive; Paterson & Busby, Memphis, Tenn., log haul.

Charles H. Besly & Co., 10 and 12 North Canal st., Chicago, manufacturers and dealers in machinists' hardware, report a very successful business for the year 1898. A decided improvement was noted in the demand for the specialties of their own manufacture, viz., taps of every description, Badger and Gardner die stocks, Helmet sheet bronze and wire for springs, parallel clamps, Perfection and Bonanza oil cups, and Gardner grinders, their celebrated Helmet solid oil, and Mannocitin, a rust preventive. Among foreign orders for the above materials are noted shipments to England, Russia, France and India, Brazil, the Argentines, Uruguay, Chili, Peru, Bolivia, in addition to large shipments to the jobbers and manufacturers in this country. The Beloit, Wis., plant

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6. *A separator that will "WORK ALL RIGHT."*
7. *A separator that will give such satisfaction it will be a pleasure to recommend it to a personal friend.*

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(Separator Department.)
Manufacturers of the **PHILADELPHIA, PA.**
COCHRANE HEATERS.

of this firm is being run full time, and they consider the outlook for the future very bright.

As another evidence of improved business conditions general throughout the country, the Cleveland Tool & Supply Co., Cleveland, advise us that it has added to its present facilities the store room at No. 8 South Water st., continuing to occupy all of the present space at No. 5 Long st. as well. This makes a very central location, and gives advantages for window display, and room in which to add increased stocks of factory and mill supplies.

The Newton Machine Tool Co., Philadelphia, has filled orders for armor plate cold cutting saws for the Carnegie Steel Co., and the Bethlehem Iron Co. These were placed after foreign cold saws had been thoroughly tried. The Newton Machine Tool Co. also has a number of foreign contracts on hand.

W. S. Rockwell & Co., New York, have just finished a complete annealing plant for the U. S Government Arsenal at Philadelphia, consisting of four double shell annealig furnaces and one double steel jacket annealing furnace. These furnaces are operated with fuel oil under the Rockwell system, which was also installed by Messrs. Rockwell & Co.

A shut-down of the Ellwood, Pa., works of the Shelby Steel Tube Co., for 30 days is reported, owing to stock accumulations.

The removal of the Union Switch & Signal Co., Swissdale, Pa., to a site in the Turtle Creek valley, is said to be considered, as part of a plan for the concentration of the Westinghouse interests, but no definite decision has been made.

The McCool Tube Co., Beaver Falls, Pa , is running night and day to fill orders. One bicycle order calls for 82,000 feet of tubing a week.

A considerable shipment of armor for the Alabama was made last week by the Bethlehem Iron Co. The Alabama contract is well along.

The Kieckhefer Bros. stamping and ware manufacturing plant at Milwaukee, has been acquired by the grantite ware combination. A controlling interest sold for $1,000,000.

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No. 1.	Capacity,	4 inches.
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The A B C of Iron, Now $1.

The Houston, Stanwood & Gamble Co., Cincinnati, has been incorporated to succeed the firm, for the manufacture of engines, boilers, etc., and to do a general machine shop business.

A Youngstown, O., special notes a reduction in the wages of the tonnage men at the Ohio Steel Co.'s plant who have been receiving highest pay. After the reduction, it is stated that the rate will still be in excess of that paid at Braddock and other steel works.

The case of the American Trust & Savings Bank against Receiver McGettigan, of the Premier Steel Co., will be argued again soon in Indiana Supreme court. It involves $100,000.

A. Whitney & Sons, Philadelphia announce that they have resumed the manufacture of chilled wheels under the style of the Whitney Car Wheel Works. In addition to their old patterns and chills, they have the drawings and records of oders for the past 52 years.

There has been more buying of securities of the Colorado Fuel & Iron Co. recently. The operations of the past six months are said to show good results, the balance sheet at the close of the year showing a credit to profit and loss of $275,952. The loss in the iron department in 1898 was due to heavy expense in starting the new mill. The surplus of cash assets over cash liabilities at the end of the year was $1,572,383.

The stockholders of the Shelby Steel Tube Co., Shelby, O., will vote Jan. 30 on a proposition to issue preferred stock not to exceed $1,000,000.

For some time past there has been trouble at the sheet plant of the Old Meadow Rolling Mill Co., Scottdale, Pa., over the matter of wages. The mill was built last year by the former employes of the Scottdale Iron & Steel Co., which became non-union in 1897, local capitalists assisting to the extent of about two-thirds of the cost of the plant. The strikers who had subscribed for stock were to be the employes, and it was supposed the mill would be run union, but the management refused to sign the scale, and for some time past the provisions have been violated, until six weeks ago the men were asked to accept a reduction of 20 per cent, or work one day in ten for nothing. They refused, and a strike is now on. The management felt that with the depressed condition of the sheet trade the wages should be the same as in the other sheet mills in Scottdale, while the men claimed the alleged greater efficiency of union labor should make up the difference. The mill has not run steadily since its completion. President Shafer of the Amalgamated Association says that the strikers willl have the full support of that organization in resisting the reduction.

The Rice Machinery Co., Chicago, has secured an order from Foogner Bros., Iola, Wis., for a considerable amount of power transmission machinery.

The Altoona Iron Co., Altoona, Pa., employing 140 men, has recently received orders sufficient to keep its guide mills in full operation for three weeks.

The Ashland Iron & Steel Co., operating Hinkle charcoal furnace at Ashland, Wis., will build by-product charcoal kilns near the furnace plant, and save the products of waste gases.

The Morgan Engineering Co., Alliance, O., has delivered to the Government 20 of the 42 disappearing gun carriages contracted for last April. The carriages are built for 8-inch, 10 and 12-inch guns, and are intended for coast defenses. The Morgan Engineering Co. has 700 employes and is running night and day.

The old Weston Engine Co., plant at Painted Post, N. Y., has been sold to the Rand Drill Co., of Tarrytown, N. Y.

The mills and houses of the Catasauqua Mfg. Co., Allentown, Pa., were sold Jan. 3, by the trustees. Twenty-four houses and a lot were bought by Jacob Roberts, of the Bryden Horse Shoe Works, for $5,300. Mills A and C in that town were sold to Baird & Co., of Philadelphia, for $16,000. Mill B, at Fulterton, was sold to the Catasauqua Iron Co. for $6,750. Mill D, which adjoins Mill B, was sold to McClure, of Philadelphia for $13,800. The 31 houses in Fulterton and Ferndale were sold to J. W. Fulter for $3,700. The plant of the Catasauqua Mfg Co. represented an investment of over $500,000.

The Henry Martin Brick Machine Mfg. Co., of Lancaster, Pa., has received an order from China for machines.

The nail product at Ironton. O., last year was 110,990 kegs for the Belfont mill and 117,300 kegs for the Kelly plant—together 114,000 kegs less than in 1897. The Belfont plant produced 1,162 tons of muck iron.

The Pratt & Whitney Co., of Hartford, Conn., has leased a store at Seneca and Wells sts., Buffalo, and a $25,000 stock will be carried.

The Knoxville Iron Co., Knoxville, Tenn., shipped 100 tons of bar iron to Santiago de Cuba last week.

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Tin Plate Bars, Steel Billets, Blooms and Bessemer Pig Iron.

It is reported that Bristol Furnace, Bristol, Va., will be acquired by Geo. L. Carter of Pulaski, Va., and others who are getting control of Virginia furnaces in one company.

Another annealing oven is being built by the Inter-State Malleable Iron & Machine Works, Duluth, and a third is to be added soon.

The Springfield (O.) Machine Tool Co., P. E. Montanus, manager, recently booked a $50,000 order for machinery. It came through Berlin.

At a meeting of the board of directors of the American Steel & Wire Co., at the company's offices, in Chicago, Dec. 31, a dividend of 1¾ per cent on the preferred stock was declared, payable Jan. 14.

It has been prematurely announced that the Pittsburg Plate Glass Co. had sold the property on which the Howard Plate Glass Works stood at Duquesne, Pa., to the Carnegie Steel Co., Ltd. Negotiations have been in progress for some time, but the sale has not yet been concluded. The Howard Plate Glass Co. was absorbed on the formation of the Pittsburg Plate Glass Co., and the works have not been operated since then.

The Playford Stoker Co., Cleveland, has made the following sales recently through its Pittsburg agent, W. J. Brant: Thirty 250 h. p. stokers to the Apollo Iron & Steel Co.; one 250 h. p. to Heintz & Co.; three 250 h. p. to the Crystal Ice Co., Allegheny, and 24,000 h. p. to the National Tube Works Co., McKeesport.

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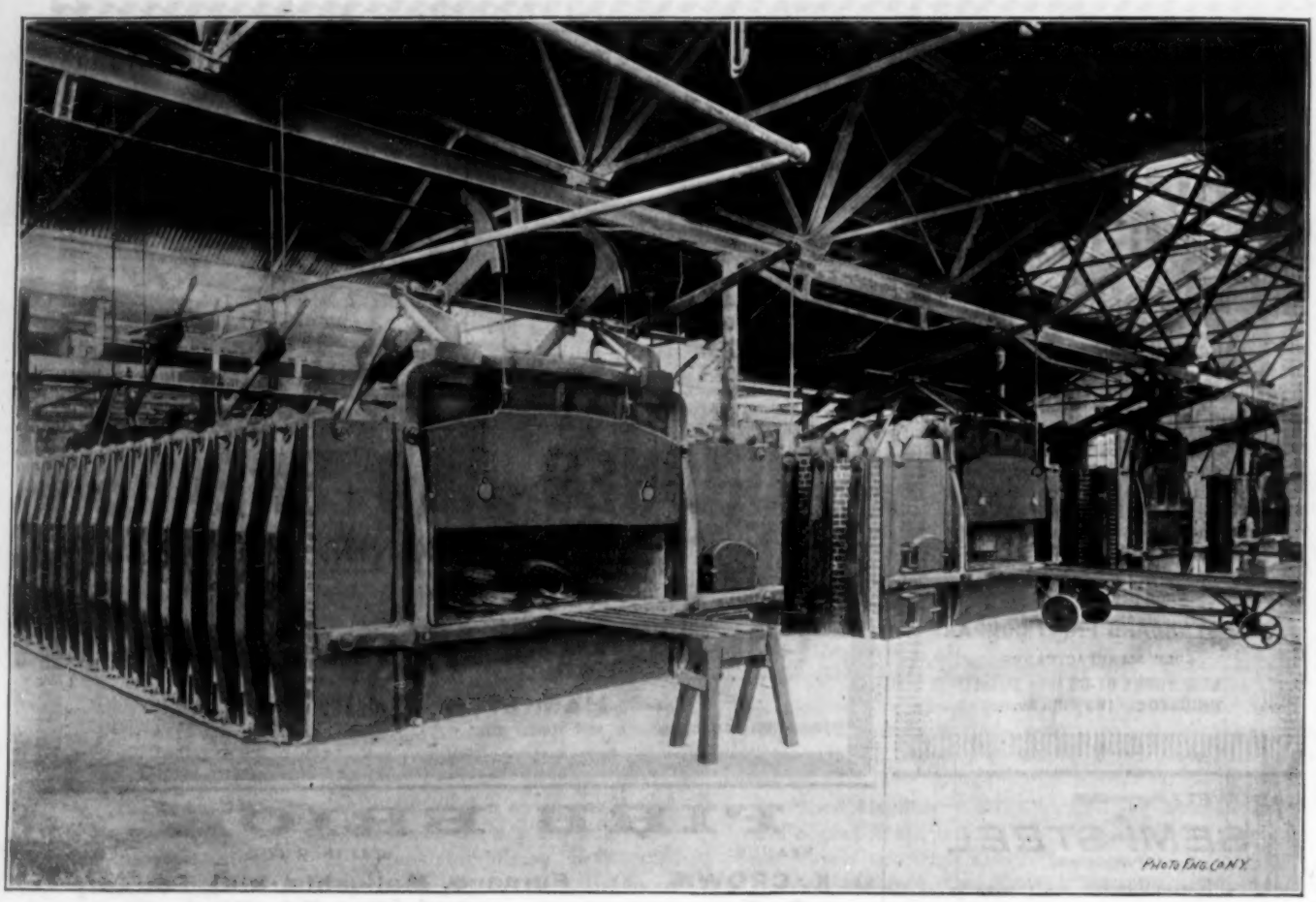

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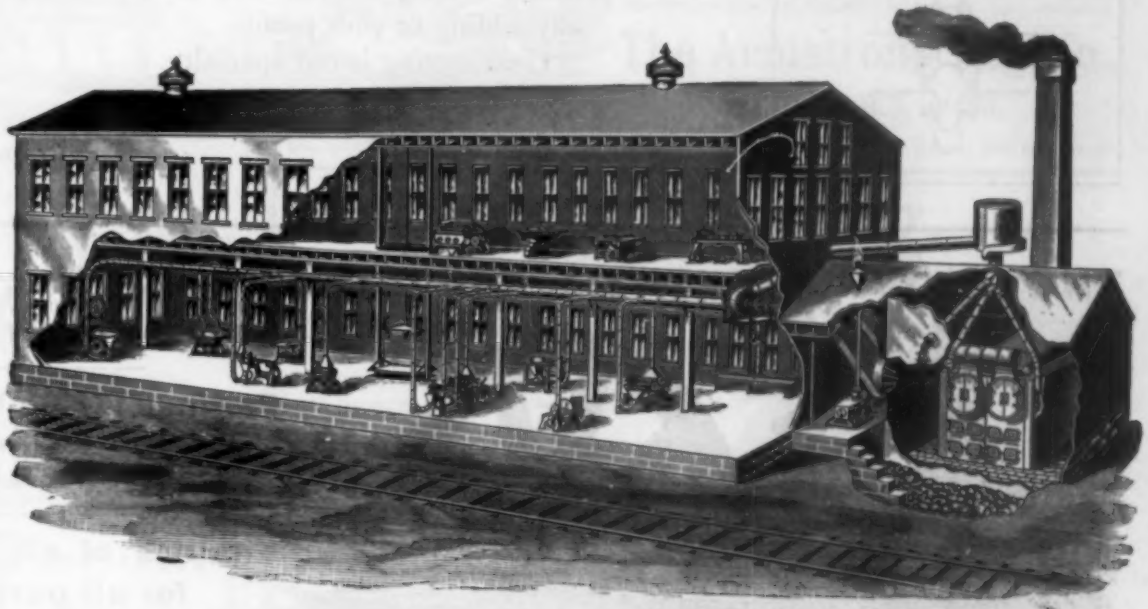

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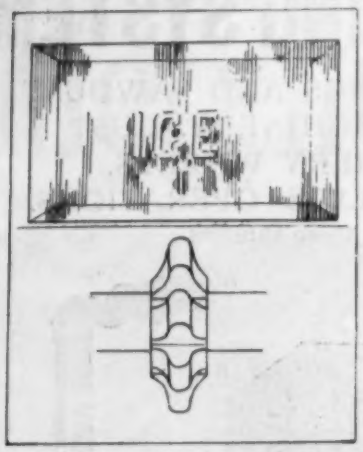

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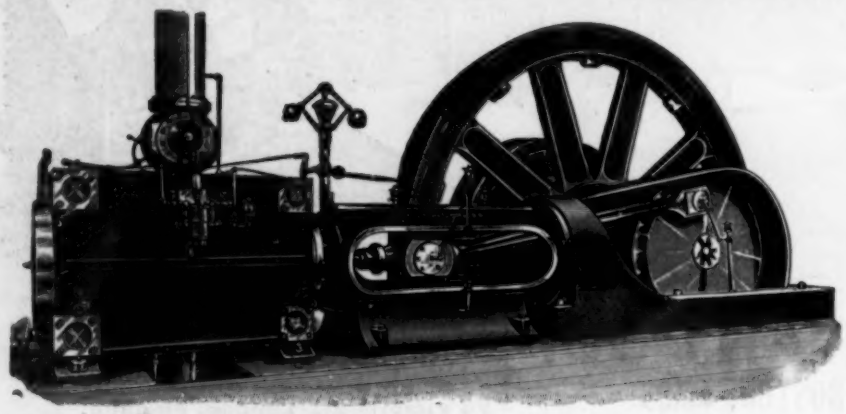

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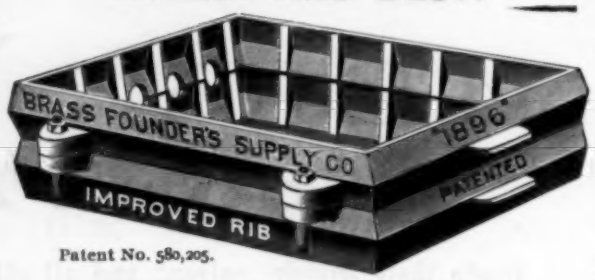

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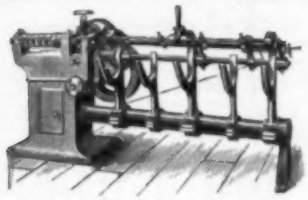

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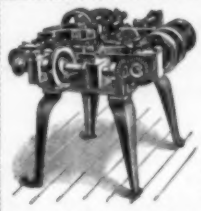

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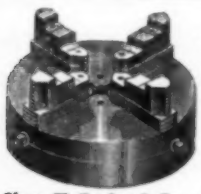

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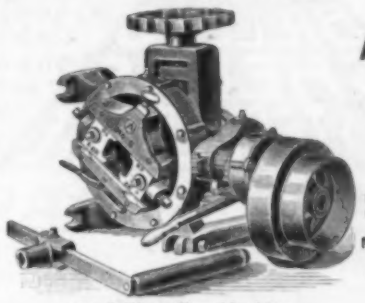

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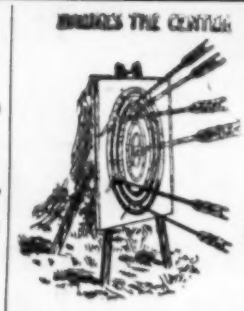

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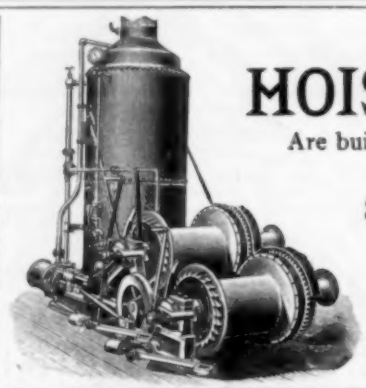

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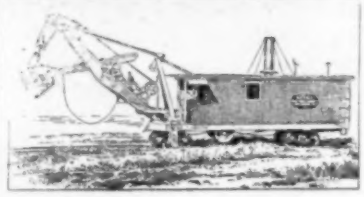

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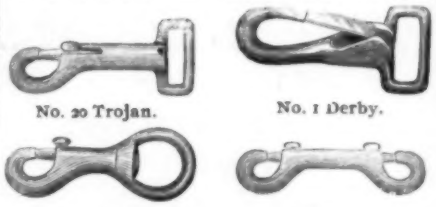

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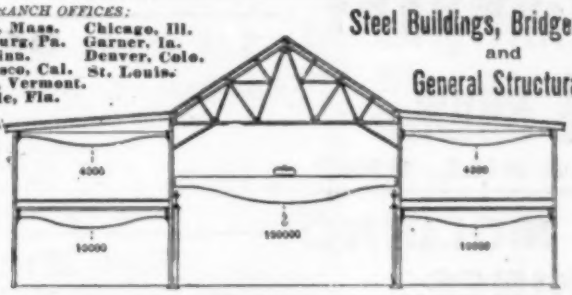

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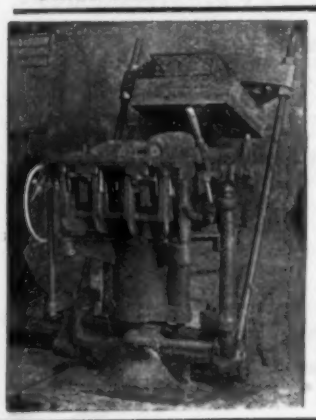

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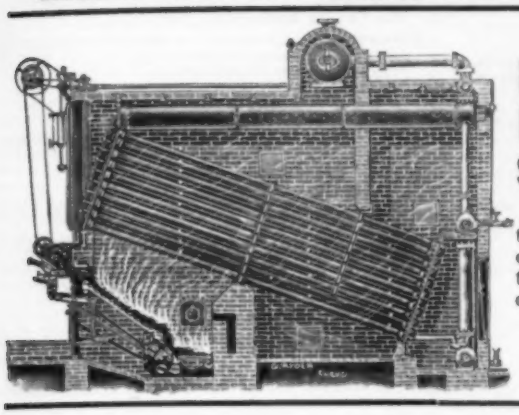

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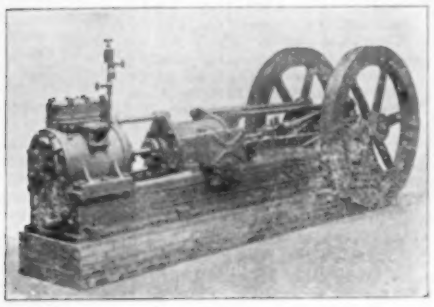

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Brass Founders' Supply Co., Newark, N. J.
The Aultman Co., Canton, O.
W. A. Wood Mowing & Reaping Machine Co., Hoosick Falls, N. Y.

Foundry Equipments—
The S. Obermayer Co., Cincinnati, O.

Foundry Supplies—
Clearfield Fire Brick Co., Clearfield, Pa.
The Ohio Sand Co., Conneaut, O.
Union Mining Co., Mt. Savage, Md.
Dover Fire-Brick Co., Cleveland, O.
Tabor Mfg. Co., Elizabeth, N. J.
F. B. Stevens, Detroit, Mich.
Heber Wells, New York City.
Millett Core Oven Co., Brightwood, Mass.
Hanson McDowell, Chicago, Ill.
Cleveland Facing Mill Co., Cleveland, O.
The S. Obermayer Co., Cincinnati, O.
Garden City Sand Co., Chicago, Ill.
James Irwin & Co., Pittsburg, Pa.
Chicago Fire Clay Product Co., Chicago, Ill.
Brass Founders' Supply Co., Newark, N. J.
Standard Sand Co., Everett, O.
Columbia Fire Clay Co., Cleveland, O.
Vulcan Mfg. Co., Pittsburg, Pa.
Scioto Star Fire Brick Works, Portsmouth, O.
Kentucky Fire Brick Works, Portsmouth, O.
Webster Fire Brick Co., South Webster, O.
Ætna Fire Brick Co., Oak Hill, O.
J. V. Rose, Sharon, Pa.
Diamond Fire Brick Works Akron, O.
Oak Hill Fire Brick & Coal Co., Oak Hill, O.

Foundry Facings—
The S. Obermayer Co., Cincinnati, O.
Cleveland Facing Mill Co., Cleveland, O.

Forgings—
Cleveland City Forge & Iron Co., Cleveland, O.
Bethlehem Iron Co., South Bethlehem, Pa.
Bræburn Steel Co., Braeburn, Pa
Wyman & Gordon, Worchester, Mass.

Friction Metal—
C. H. Besly & Co., Chicago, Ill.
North American Metaline Co., Long Island City, New York.
Swarts Metal Refining Co., Chicago, Ill.

Furnaces—
Brightman Furnace Co., Cleveland, O.
Playford Stoker Co., Cleveland, O.

Furnace Linings—
Union Mining Co., Mt. Savage, Md.

Fuel Oil Burners—
W. S. Rockwell & Co., New York City
American Gas Furnace Co., New York City.

Galvanized Iron—
Apollo Iron & Steel Co., Pittsburg, Pa.

Galvanizers—
Ætna-Standard Iron & Steel Co., Bridgeport, O.
Apollo Iron & Steel Co., Pittsburg, Pa.

Galvanizing Pots—
Wm. B. Pollock & Co., Youngstown, O.

Gas Burners—
American Gas Furnace Co., New York City.

Gas Furnaces
American Gas Furnace Co., New York City.

Gear Cutting—
The R. D. Nuttall Co., Allegheny, Pa.
Brainard Milling Machine Co., Hyde Park, Mass.

Gear Cutters—
Brainard Milling Machine Co., Hyde Park, Mass.

Grindstones—
C. H. Besly & Co., Chicago, Ill.

Graphite Paint—
Jos. Dixon Crucible Co., Jersey City N. J.

Gray Iron Castings—
W. A. Jones Foundry Co., Chicago, Ill.
The Lane & Bodley Co., Cincinnati, O.
Brass Founders' Supply Co., Newark, N. J.

Hack Saws—
Millers Falls Co., New York City.
Q & C Co., Chicago, Ill.

Hangers—
E. A. Delano, Chicago, Ill.
Rice Machinery Co., Chicago, Ill.
The Aultman Co., Canton, O.

Harness Snaps—
Covert Mfg. Co., West Troy, N. Y.

Hoists—
Edwin Harrington Son & Co., Philadelphia.
Reading Crane & Hoist Works, Reading, Pa.
The Lane & Bodley Co., Cincinnati, O.
The Aultman Co., Canton, O.
Lidgerwood Mfg. Co., New York City.

Heaters and Purifiers—
Harrison Safety Boiler Works, Philadelphia.
Stilwell-Bierce & Smith-Vaile Co., Dayton O.

Heating and Ventilating Apparatus
B. F. Sturtevant Co., Boston.

Heavy Hardware—
C. H. Besly & Co., Chicago, Ill
Parkhurst & Wilkinson Co., Chicago, Ill.

Hoisting Engines—
The Edward P. Allis Co., Milwaukee, Wis.
Earle C. Bacon, New York City.
The Lane & Bodley Co., Cincinnati, O.
Lidgerwood Mfg. Co., New York City.
The Aultman Co., Canton, O.

Hoisting Machinery—
Link-Belt Machinery Co., Chicago, Ill.
Reading Crane & Hoist Works, Reading, Pa.
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The Brown Hoisting and Conveying Machine Co., Cleveland, O.

Horse Shoes—
Phoenix Horse Shoe Co., Joliett, Ill.

Hotels—
United States Hotel Co., Cleveland, O.

Hydraulic Machinery—
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.

Injectors—
C. H. Besly & Co., Chicago, Ill.

Insurance Companies—
Hartford Steam Boiler I. & I. Co., Hartford, Ct.

Iron Buildings—
Shiffler Bridge Co., Pittsburg, Pa.
Berlin Iron Bridge Co., East Berlin, Conn.
Pittsburg Bridge Co., Pittsburg, Pa.
Riter-Conely Co., Pittsburg, Pa.

Iron Nails and Steel—
Bethlehem Iron Co., South Bethlehem, Pa.
C. H. Besly & Co., Chicago, Ill.
R. H. Stroud & Co., Chicago, Ill.
Parkhurst & Wilkinson Co., Chicago, Ill.

Iron and Steel Roofing—
Berger Mfg. Co., Canton, O.
Ætna-Standard Iron & Steel Co., Bridgeport, O.

Iron Ore—
Lake Superior Consolidated Iron Mines New York City, N. Y.
Oglebay, Norton & Co., Cleveland, O.
M. A. Hanna & Co., Cleveland, O.

Iron Working Tools—
H. Bickford, Lakeport, N. H.
C. H. Besly & Co., Chicago, Ill.
John Adt & Son, New Haven, Conn.
U. Baird Machinery Co., Pittsburg, Pa.
Edwin Harrington Son & Co., Philadelphia, Pa.
Fox Machine Co., Grand Rapids, Mich.
Armstrong Bros. Tool Co., Chicago, Ill.
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Chicago Die and Machine Works, Chicago, Ill.
Bickford Drill & Tool Co., Cincinnati, O.
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Brainard Milling Machine Co., Hyde Park, Mass.
Baush & Harris Machine Tool Co., Springfield, Mass.

Link Belting—
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Link-Belt Machinery Co., Chicago, Ill.
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Ladles—
The S. Obermayer Co., Cincinnati, O.

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U. Baird Machinery Co., Pittsburg, Pa.
Edwin Harrington, Son & Co., Philadelphia.
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Machinery Name Plates—
August Becker, Boston, Mass.

Machinists' Tools and Supplies—
H. Bickford, Lakeport, N. H.
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U. Baird Machinery Co., Pittsburg, Pa.
Bertsch & Co., Cambridge City, Ind.
Edwin Harrington Son & Co., Philadelphia, Pa.
Fox Machine Co., Grand Rapids, Mich.
Armstrong Bros. Tool Co., Chicago, Ill.
Bickford Drill & Tool Co., Cincinnati, O.
Parkhurst & Wilkinson Co., Chicago, Ill.
Skinner Chuck Co., New Britain, Conn.
Cleveland Tool & Supply Co., Cleveland, O.
Baush & Harris Machine Tool Co., Springfield, Mass.

Machine Screws—
C. H. Besly & Co., Chicago, Ill

Machine Shops—
The R. D. Nuttall Co., Allegheny, Pa.
The Lane & Bodley Co., Cincinnati, O.

Machinery and Tool Steel—
C. H. Besley & Co., Chicago, Ill.
Bræburn Steel Co., Bræburn, Pa.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa
Sanderson Bros. Steel Co., Cleveland, O.
Byron H. White, Chicago, Ill.
Morris & Bailey Steel Co., Pittsburg, Pa.

Magnesia Covering—
C. H. Besly & Co., Chicago, Ill.

Malleable Iron Castings—
W. A. Wood Mowing & Reaping Machine Co., Hoosick Falls, N. Y.

Manufacturing Chemists—
James Irwin & Co., Pittsburg, Pa.

Manufactured Iron & Steel—
Bourne-Fuller & Co., Cleveland, O.
Cleveland Rolling Mill Co., Cleveland, O.
Ætna-Standard Iron & Steel Co., Bridgeport, O.
The Morris & Bailey Steel Co., Pittsburg, Pa.
Parkhurst & Wilkinson Co., Chicago, Ill.
Ohio Steel Co., Youngstown, O.

Metal Bearings—
North American Metaline Co., Long Island City, N. Y
C. H. Besly & Co., Chicago, Ill.

Milling Machines—
U. Baird Machinery Co., Pittsburg, Pa.
Fox Machine Co., Grand Rapids, Mich.
Brainard Milling Machine Co., Hyde Park, Mass.

Mining Machinery—
C. H. Besly & Co., Chicago, Ill.
The Edward P. Allis Co., Milwaukee, Wis.
Earle C. Bacon, New York City.
The Lane & Bodley Co., Cincinnati, O.
Jeffrey Mfg. Co., Columbus, O.
Lidgerwood Mfg. Co., New York City.
Wm. Cramp & Sons, Philadelphia, Pa.
The Bucyrus Co., South Milwaukee, Wis.
Marion Steam Shovel Co., Marion, O.

Molding Machines—
Tabor Mfg. Co., Elisabeth, N. J.

Molding Sand—
Ohio Sand Co., Conneaut, O.
F. B. Stevens, Detroit, Mich.
S. Obermayer Co., Cincinnati, O.
Garden City Sand Co., Chicago, Ill.
Standard Sand Co., Everett, O.

Molders' Tools—
The S. Obermayer Co., Cincinnati, O.

Name Plates—
August Becker, Boston, Mass.

Nickel Plating Outfits—
The Hanson & Van Winkle Co., Newark, Chicago, New York.
Northampton Emery Wheel Co., Chicago, Ill.
Bennett & O'Connell Co., Chicago, Ill.

Nuts and Bolts
Rockford Bolt Works, Rockford, Ill.
Upson Nut Co., Cleveland, O.

Oilless Bearings—
North American Metaline Co., Long Island, City, N. Y.
C. H. Besly & Co., Chicago, Ill.

Oil Burners—
W. S. Rockwell & Co., New York City.
American Gas Furnace Co., New York City.

Oil Cups—
C. H. Besly & Co., Chicago, Ill.

Oil Pumps—
C. H. Besly & Co., Chicago, Ill.

Ore Crushers—
The Edward P. Allis Co., Milwaukee, Wis.
Jeffrey Mfg. Co., Columbus, O.
The Aultman Co., Canton, O.

Ore Screens—
Rob't Aitchison Per. Metal Co., Chicago, Ill.
Harrington & King Per. Co., Chicago, Ill.
A. J. Beckley & Co., Garwood, N. J.
The Aultman Co., Canton, O.

Packing—
C. H. Besly & Co., Chicago, Ill
Jenkins Bros., New York City.

Paint—
Iron Clad Paint Co., Cleveland, O.
Jos. Dixon Crucible Co., Jersey City, N. J.
Standard Paint Co., New York, City.

Pattern Letters—
Heber Wells, New York City.

Pattern Works—
Gobeille Pattern Co., Cleveland, O.

Perforated Sheet Metal—
Harrington & King Perforating Co., Chicago, Ill
Aitchison Perforated Metal Co., Chicago, Ill.
A. J. Beckley & Co., Garwood N. J.

Pig Iron—
Clinton Iron & Steel Co., Pittsburg.
Forster, Waterbury & Co., Chicago, Ill.
Bourne-Fuller Co. Cleveland, O.
M. A. Hanna & Co., Cleveland, O.
R. H. Stroud & Co., Chicago, Ill.
F. B. Stevens, Detroit, Mich.
McKeefrey & Co., Leetonia, O.
Superior Charcoal Iron Co., Grand Rapids, Mich
Hickman & Williams, Chicago, Ill.
Shenango Valley Steel Co., New Castle, Pa.
Spearman Iron Co., Sharpsville, Pa.

Pipe Covering—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.

Pipe Cutting and Threading Machines—
The Armstrong Mfg. Co., Bridgeport, Conn.

Planers—
U. Baird Machinery Co., Pittsburg, Pa.
Bickford Drill & Tool Co., Cincinnati, O.

Plates—
Enterprise Boiler Co., Youngstown, O.

Plumbago—
The S. Obermayer Co., Cincinnati, O.

Plumbers' and Gas Fitters' Supplies—
C. H. Besly & Co., Chicago, Ill.

Pneumatic Appliances—
Clayton Air Compressor Works, New York.

Pneumatic Tools —
American Pneumatic Tool Co., New York City.

Portable Forge—
C. H. Besly & Co., Chicago, Ill.
B. F. Sturtevant Co., Boston, Mass.
Vulcan Mfg. Co., Pittsburg, Pa.

Power Drop Hammers—
Baush & Harris Machine Tool Co., Springfield Mass.

Power Presses—
Bertsch & Co., Cambridge City, Ind.
Fox Machine Co., Grand Rapids, Mich.
The Long & Allstatter Co., Hamilton, O.
Ferracute Machine Co., Bridgeton, N. J.

Power Transmission Machinery—
Jeffrey Mfg. Co., Columbus, O.
The Lane & Bodley Co., Cincinnati, O.
E. A. Delano, Chicago, Ill.
Rice Machinery Co., Chicago, Ill.
The Aultman Co., Canton, O.

Presses—
Bertsch & Co., Cambridge City, Ind.
C. H. Besly & Co., Chicago, Ill.
The Long & Allstatter Co., Hamilton, O.
Ferracute Machine Co., Bridgeton, N. J.

Pressure Gauges—
The Bristol Co., Waterbury, Conn.

Pulleys—
W. A. Jones Foundry Co., Chicago, Ill.
The Lane & Bodley Co., Cincinnati, O.
E. A. Delano, Chicago, Ill.
Rice Machinery Co., Chicago, Ill.
The Aultman Co., Canton, O.
Jeffrey Mfg. Co., Columbus, O.

Pumps (Steam)—
The Edward P. Allis Co., Milwaukee, Wis.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O
Blakeslee Mfg. Co., Du Quoin, Ill,

Punches—
The Long & Allstatter Co., Hamilton, O.
Ferracute Machine Co., Bridgeton, N. J.

Pyrometers—
Edward Brown, Philadelphia, Pa.
Uehling, Steinbart & Co., Newark, N. J.
Vulcan Mfg. Co., Pittsburg, Pa.

Railway Supplies—
Cleveland City Forge & Iron Co., Cleveland, O.

Rivets—
Champion Rivet Co., Cleveland, O.

Riveted Steel Pipe—
Wm. B. Pollock & Co. Youngstown, O.

Rock Drills—
Rand Drill Co., Chicago, Ill.
The Ingersoll-Sergeant Drill Co., New York.

Rolling Mill Machinery—
Rarig Engineering Co., Columbus, O.

Roofs—
Shiffler Bridge Co., Pittsburg.
Berlin Iron Bridge Co., East Berlin, Conn.
Pittsburg Bridge Co., Pittsburg, Pa.
Riter-Conley Mfg. Co., Pittsburg, Pa.

Sand—
David Tod Sand Co., Youngstown, O.

Sand and Chill Rolls—
Seaman, Sleeth Co., Pittsburg, Pa.

Saws—
Peter Gerlach & Co., Cleveland, O.

Screens for Coal Ore, Etc.
Robt. Aitchison Perforated Metal Co., Chicago.
Harrington & King Perforating Co., Chicago.
Jeffrey Mfg. Co., Columbus, O.
A. J. Beckley & Co., Garwood, N. J.
The Aultman Co., Canton, O.

Screws—
C. H. Besly & Co., Chicago, Ill.
Upson Nut Co., Cleveland, O.
Chicago Screw Co., Chicago, Ill
Rockford Bolt Works, Rockford, Ill.

Shafting—
The Lane & Bodley Co., Cincinnati, O.
E. A. Delano, Chicago, Ill.
Fitzsimmons & Co., Cleveland, O.
Rice Machinery Co., Chicago, Ill.
The Aultman Co., Canton, O.
Jeffrey Mfg. Co., Columbus, O.

Shapers—
Baush & Harris Machine Tool Co., Springfield, Mass.

Shearing and Punching Machinery—
Bertsch & Co., Cambridge City, Ind.
Fox Machine Co., Grand Rapids, Mich.
The Long & Allstatter Co., Hamilton, O.
Ferracute Machine Co., Bridgeton, N. J.

Sheet Iron—
Cleveland Rolling Mill Co., Cleveland, O.
Ætna-Standard Iron & Steel Co., Bridgeport, O.
R. H. Stroud & Co., Chicago, Ill.

Ship Yards—
Wm. Cramp & Sons, Philadelphia, Pa.

Special Machinery—
Edwin Harrington Son & Co., Philadelphia.
Q & C Co., Chicago, Ill.
A. H. Nilson Machine Co., Bridgeport, Conn.
The Aultman Co., Canton, O.
Jeffrey Mfg. Co., Columbus, O.

Stand Pipes—
Wm. B. Pollock & Co., Youngstown, O.

Steam Boiler Inspectors—
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

Steam Pipe and Boiler Covering—
C. H. Besly & Co., Chicago Ill.

Steam Packing—
C. H. Besly & Co., Chicago, Ill.

Steam Pumps—
Hall Steam Pump Co., Pittsburg, Pa.
Stilwell-Bierce & Smith-Vail Co., Dayton, O.
Blakeslee Mfg. Co., Du Quoin, Ill.

Steam Shovels and Dredges—
Marion Steam Shovel Co., Marion, O.
The Bucyrus Co., South Milwaukee, Wis.

Steam Specialties—
C. H. Besly & Co., Chicago, Ill.

Steel—
Otis Steel Co., Cleveland, O.
Miller, Wagoner, Fieser & Co., Chicago, Ill.
R. H. Stroud & Co., Chicago, Ill.
Bræburn Steel Co., Bræburn, Pa.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa.
The Morris & Bailey Steel Co., Pittsburg, Pa.
Sanderson Bros. Steel Co., Cleveland, O.
Byron H. White, Chicago, Ill.

Steel Castings—
Otis Steel Co., Cleveland, O.
Q & C Co., Chicago, Ill.
Hanson McDowell, Chicago, Ill.

Steel Plants—
Wm. B. Pollock & Co., Youngstown, O.
The Riter-Conley Co., Pittsburg, Pa.

Steel Blooms and Billets—
Cleveland Rolling Mill Co., Cleveland.
Bethlehem Iron Co., South Bethlehem, Pa.
Ohio Steel Co., Youngstown, Ohio.
Shenango Valley Steel Co., New Castle, Pa.

Steel Stamps and Stencils—
J. H. Fleharty & Co., Cleveland, O.

Semi-Steel—
Hanson McDowell, Chicago, Ill.

Stokers—
Playford Stoker Co., Cleveland, O.
Brightman Furnace Co., Cleveland, O.

Tanks—
Enterprise Boiler Co., Youngstown, O.
Meehan Boiler & Construction Co., Lowellville, Ohio.
Wm. B. Pollock & Co., Youngstown, O.
Rarig Engineering Co., Columbus, O.
Riter-Conley Mfg. Co., Pittsburg, Pa.
The Aultman Co., Canton, O.

Tank Cars—
Wm. B. Pollock & Co., Youngstown, O.

Tin and Terne Plates—
B. P. Crane & Co., Chicago, Ill.
R. H. Stroud & Co., Chicago, Ill.

Tool Steel—
C. H. Besly & Co., Chicago, Ill.
Bræburn Steel Co., Bræburn, Pa.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa.
Sanderson Bros. Steel Co., Cleveland, O.

Transmission Machinery—
Heyl & Patterson, Pittsburg, Pa.
Link-Belt Machinery Co., Chicago, Ill.
The Lane & Bodley Co., Cincinnati, O.
W. A. Jones Foundry & Machine Co., Chicago, Ill
Jeffrey Mfg. Co., Columbus, O.
Rice Machinery Co., Chicago, Ill.
The Aultman Co., Canton, O.
Brown Hoisting and Conveying Machine Co., Cleveland, Ohio.

Tubes—
National Tube Works, McKeesport, Pa.

Tube Welding—
S. Fix Sons, Cleveland, O.

Tumbling Mills—
The S. Obermayer Co., Cincinnati, O.

Turnbuckles—
Cleveland City Forge & Iron Co., Cleveland, O.

Twist Drills—
C. H. Besly & Co., Chicago, Ill.

Twist Drill Cases—
Vulcan Mfg. Co., Pittsburg, Pa.

Valves—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.

Ventilating Fans—
B. F. Sturtevant Co., Boston, Mass.

Wire Machinery—
John Adt & Son, New Haven, Conn.
S. W. Goodyear, Waterbury, Conn.
A. H. Nilson Machine Co., Bridgeport, Conn.

Wire Nails—
Cleveland Rolling Mill Co., Cleveland, O.
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Wood Pulleys—
Rice Machinery Co., Chicago, Ill.

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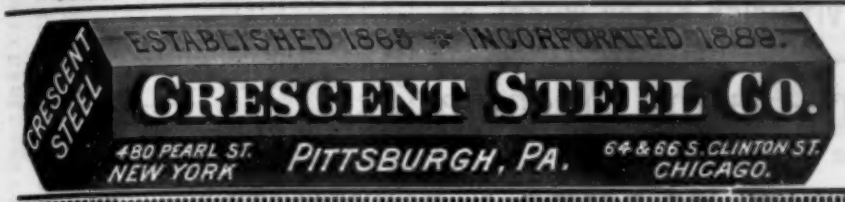
BRÆBURN STEEL COMPANY, Bræburn, Pa.
MANUFACTURERS OF
FINE TOOL STEEL AND FORGINGS. ALSO SPRING HAMMER, AND MACHINERY STEEL OF HIGH QUALITY. FINE OPEN-HEARTH STEEL.

DIRECTORS:
Wm. Metcalf,
Chas. Metcalf,
P. B. Hasbrouck.
R. P. Kelly,
Sec'y. and Treas.

THE SANDERSON TOOL STEEL.....

IS
EASY TO GET..... Our stock is so large and well assorted that all ordinary orders are filled the same day they are received.
EASY TO WORK.....Our annealed steel has never been equalled.
EASY TO TEMPER...This steel is not over sensitive and will stand any ordinary handling without cracking when you come to harden the finished tool.
EASY TO PAY FOR...When its good qualities are so apparent.
It pays to use "the most reliable tool steel in the market."
SANDERSON BROTHERS STEEL CO., Cleveland Warehouse: 97 Water St., CLEVELAND, O.


CRESCENT STEEL
ESTABLISHED 1866 ✦ INCORPORATED 1889.
CRESCENT STEEL CO.
480 PEARL ST. NEW YORK
PITTSBURGH, PA.
64 & 66 S. CLINTON ST. CHICAGO.

La BELLE STEEL CO., Pittsburgh, Pa.
MANUFACTURERS OF FINE
CRUCIBLE CAST TOOL STEEL.
SPECIAL GRADES FOR ALL PURPOSES.
BYRON H. WHITE,
Western Selling Agent.
OFFICE AND WAREHOUSE: **68 and 70 South Canal St., Chicago.**

ECLIPSE
"ECLIPSE" COLD DRAWN
SHAFTING
FITZSIMONS & CONNELL DREDGING CO.
BYRON H. WHITE WESTERN SELLING AGENT
WAREHOUSE & OFFICE 68-70 SO. CANAL ST. CHICAGO

BYRON H. WHITE, Western Selling Agent,
68-70 South Canal St., Chicago.

THE MORRIS & BAILEY STEEL CO.
FLAT & COILED FOR STAMPING BLANKING DRAWING SPRINGS ETC
COLD ROLLED STRIP STEEL
PITTSBURG, PA.
BYRON H. WHITE
WESTERN SELLING AGENT
WAREHOUSE (68 70 S CANAL ST & OFFICE) CHICAGO

BYRON H. WHITE, Western Selling Agent, CHICAGO.

OUR NEW
University Bicycle Saddle
WILL SOON BE READY.
LOOK FOR IT.
Parkhurst & Wilkinson Co.,
146-164 Kinzie Street, CHICAGO.

Subscribe for the Iron Trade Review, $3.00 per year.

Don't Waste Money in Your Pattern Shop.
THE GOBEILLE PATTERN CO., Cleveland.

Between the Lakes and the Gulf, the Mississippi and the Allegheny Mountains—the best buying section of the United States—is the BULK of THE IRON TRADE REVIEW'S circulation. In this section advertisers in all trade papers get best returns.

IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

Special low-phosphorus hard Ore, Bessemer	3.65
No. 1 Specular, Bessemer	3.01@3.35
No. 1 Bessemer hematite	2.75@3.15
Hematites No. 1 non-Bessemer	2.00@2.20
No 1. Specular, non-Bessemer	2.40@2.50
Mesabi Bessemer	2.20@2.35

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	11 00
No. 1 Strong Foundry	10 90@11 15
No. 2 Strong Foundry	10 40@10 65
Gray Forge, red short	10 00
Gray Forge, neutral	9 75
No. 1 American Scotch	10 65
No. 2 American Scotch	10 15@10 40
Lake Superior Charcoal	11 5
PITTSBURG:	
No. 1 Foundry	$11 00@11 30
No. 2 Foundry	10 65@10 90
Gray Forge	9 75@9 85
White and Mottled	9 15
Warm Blast Charcoal	13 00@13 50
Cold Blast Charcoal	22 00@26 00
Bessemer	11 00@11 15
CHICAGO:	
Lake Superior Charcoal	$11 50@13 00
Local Coke Foundry No. 1	11 50@12 00
Local Coke Foundry No. 2	11 00@11 50
Local Coke Foundry No. 3	10 75@11 00
Local Scotch Foundry No. 1	11 50@12 00
Local Scotch Foundry No. 2	11 00@11 50
Local Scotch Foundry No. 3	10 75@11 00
Southern Coke No. 1	@10 85
Southern Coke No. 2	@10 60
Southern Coke No. 3	@10 10
Southern No. 1 Soft	@10 80
Southern No. 2 Soft	@10 65
Southern Silveries	11 25@11 50
Jackson Co. Silveries	12 50@14 50
Ohio Silveries No. 1	@
Ohio Strong Softeners	12 00@12 50
Alabama Car Wheel	15 00@16 00
Malleable Bessemer	11 50@12 00
Coke Bessemer	11 50@12 00
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$ 10 50
Southern Coke No. 2 and No. 1 Soft	10 25
Hanging Rock Coke, No 1	11 00
Hanging Rock Charcoal No. 1, Fdy	15 50@16 00
Tennessee Charcoal No 1	14 00@14 25
Jackson County Silvery No 1	13 50@12 75
Southern Coke, Gray Forge	9 25
" " Mottled	9 25
Standard Georgia Car Wheel	14 25@1500
Tennessee " "	13 00@14 00
Lake Superior " "	14 25@14 50
BUFFALO:	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	11 00@11 25
No. 2 Foundry Strong Coke Iron Lake Superior Ore	11 50@11 75
Ohio Strong Softener No. 1	11 50@11 75
Jackson Co. Silvery No. 1	14 00
Lake Superior Charcoal	12 00@12 50
Southern Soft No. 1	12 25
" " No. 2	12 00
ST. LOUIS:	
Southern Coke No 1	$10 50
Southern Coke No. 2	10 25
Southern Coke No. 3	9 75
Southern Gray Forge	9 25
Southern Charcoal No. 1	20 50
Missouri Bessemer	13 00
Lake Superior Car Wheel	13 00
Ohio Softeners	14 00
Southern Car Wheel	15 00

OLD RAILS AND SCRAP METAL.

[Delivered Cleveland.]	Gross Tons
Old iron rails	$14 00
Old steel rails (6 ft. and over)	9 75
Old steel rails (6 ft. and under)	9 75
Old car wheels	11 00
	Net Tons
No. 1 R. R. wrought scrap	$11 50
Mill scrap	8 50
No. 1 Machine cast scrap	8 25
Iron axles	15 50
Axle turnings	8 00
Wrought turnings (free from cast)	7 00
Cast borings	5 50
Uncut wrought iron boilers	5 00
Steel boiler plates	8 00
Grate bars	5 50
Pipes and flues (clean)	7 50
Tank iron	8 00
Hoop and band iron	7 50
Sheet iron	5 25
Wrought drillings	6 50
Malleable iron	8 50

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. Cleveland)	1.40c
Angles	1.35c
Tees	1.35c
Universal Plates	1.30@1.35c
Sheared Plates	1.35c

MERCHANT IRON AND STEEL.

[Less than car-lots, Cleveland.]

Rounds and Squares.—Bar Iron.

1 to 1⅞	1.60 Base
2 to 2⅞	.20 extra
3 to 3⅜	.50 "
3⅜ to 4	.80 "
4⅛ to 4⅜	1.00 "
4⅜ to 5	1.30 "
5⅛ to 6	1.80 "
5¼ to 6⅜	2.00 "

VITRIFIED EMERY AND CORUNDUM WHEELS. . .

FOR

Foundry and Machine Shop Work.

CAN BE RUN WET OR DRY.

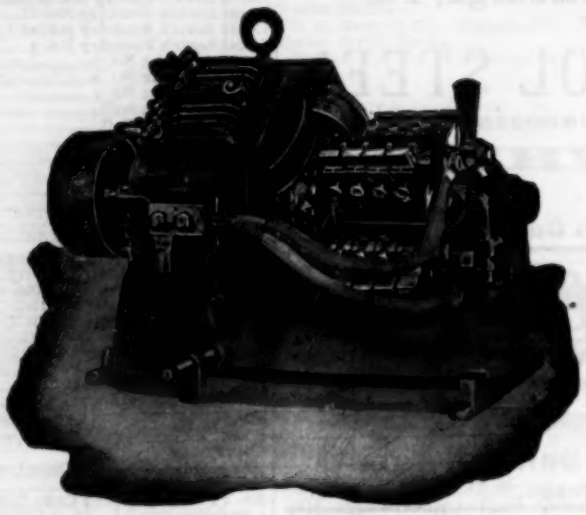
SOLD BY
Weed & Co., Buffalo, N. Y.
Strong, Carlisle & Hammond Co., Cleveland, O.
Machinist Supply Co., Chicago, Ill.
Sligo Iron Store Co., St. Louis, Mo.

VITRIFIED EMERY WHEEL CO.,
Westfield, Mass.

Eddy Dynamo Electro-Plating Machines

FOR

BICYCLE PLATING PLANTS.



NORTHAMPTON EMERY WHEEL CO., 20 S. Canal St., Chicago, Ill.

EXCLUSIVE WESTERN SELLING AGENTS.

The Chicago & North-Western Railway

REACHING with its 7,900 miles of road the famous Water Powers, Coal Fields, Iron Ore Ranges, Hard and and Soft Lumber Districts located in Illinois, Wisconsin, Michigan, Iowa, Minnesota, South Dakota, North Dakota, Nebraska and Wyoming, and by traffic arrangements with other railways, 7,350 stations located on 41,000 miles of railroad (one-ninth of the entire railroad mileage of the world, and one-fourth of the railroad mileage of the United States), has on its line more industries than any other western railroad.

Manufacturers contemplating moving or establishing branch factories in the West are requested to inquire what we can offer them before locating elsewhere.

M. HUGHITT,
General Freight Agent,
CHICAGO.

A paper that is paid for and read—THE IRON TRADE REVIEW.

6⅝ to 7¾	3.50 extra
¾ to ⅞	.10 "
⅞ to 11-16	.20 "
¾ to 9-16	.30 "
7-16 to 15-32	.40 "
½ to 13 2	.50 "
5-16 to 32	.70 "
¼ to 9-32	.90 "
7-32	1.40 "
3-16	2.50 "

Flats.—Bar Iron.

1¼ to 4 x ⅜ to 1	1.05 Base
4¼ o 6 x ⅜ to 1	.10 extra
6¼ o 8 x ⅜ to 1	.60 "
8¼ o 10 x ⅜ to 1	.80 "
1¼ o 4 x 1 1-16 to 1¼	.30 "
4¼ to 6 x 1 1-16 to 1¼	.40 "
6¼ to 8 x 1 1-16 to 1¼	.60 "
8¼ to 10 x 1 1-16 to 1¼	.90 "
2 to 4 x 1¼ to 2	.30 "
4¼ to 6 x 1¼ to 2	.60 "
6¼ to 8 x 1¼ to 2	.80 "
8¼ to 10 x 1¼ to 2	1.00 "
2 to 4 x 2¼ to 3	.60 "
4¼ to 6 x 2¼ to 3	.80 "
6¼ to 8 x 2¼ to 3	1.00 "
1¼ to 1¾ x ⅜ to 1	.10 "
1 to 1 1-16 x ⅜ to ⅞	.30 "
¼ to 15-16 x ⅜ to ¾	.40 "
⅝ to 11-16 x ⅜ to ⅝	.50 "
¼ to 9-16 x ⅜ to ⅜	.90 "

Heavy Band Iron.

7 to 10 x ¼ to 5-16	.70 extra.
6¼ to 6¾ x ¼ to 5-16	.50 "
4¼ to 6 x ¼ to 5-16	.30 "
1¼ to 4 x ¼ to 5-16	.20 "
1 to 1¾ x ¼ to 5-16	.30 "
¼ to 15-16 x ¼ to 5-16	.50 "
⅝ to 11-16 x ¼ to 5-16	.80 "
½ to 9-16 x ¼ to 5-16	1.00 "
⅜ to 7-16 x ¼ to 5-16	1.50 "

Heavy bands, 7-32 in. thick 1-10 c. per lb. higher than ¼ to 5-16 thick. **Bevel Edge Shaft Iron** 1-10 higher than same size of Heavy Bands.

Light Band Iron.

7 to 8 x No. 9 to 3-16	.90 extr
7 to 8 x Nos. 10, 11 and 12	1.00 "
6¼ to 6¾ x No. 9 to 3-16	.70 "
6¼ to 6¾ x Nos. 10, 11 and 12	.80 "
4¼ to 6 x No. 9 to 3-16	.50 "
4¼ to 6 x Nos. 10, 11 and 12	.60 "
1¼ to 4 x No. 9 to 3-16	.40 "
1¼ to 4 x Nos. 10, 11 and 12	.50 "
1 to 1 3-16 x No. 9 to 3-16	.50 "
1 to 1 3-16 x Nos. 10, 11 and 12	.60 "
13-16 to ⅞ x No. 9 to 3-16	.60 "
13-16 to ⅞ x Nos. 10, 11 and 12	.70 "
11-16 to ¾ x No. 9 to 3-16	.80 "
11-16 to ¾ x Nos. 10, 11 and 12	.90 "
9-16 to ⅝ x No. 9 to 3-16	1.00 "
9-16 to ⅝ x Nos. 10, 11 and 12	1.10 "
7-16 to ½ x No. 9 to 3-16	1.30 "
7-16 to ½ x Nos. 10, 11 and 12	1.40
⅜ x No. 9 to 3-16	1.50
⅜ x Nos. 10, 11 and 12	1.60

Bevel Edge Box Iron.

Same as Light Bands, of same sizes.

Beaded Band Iron, 1¼ in. to 2 in.

Sand Band Iron, 1-10 c. above same sizes o Light Bands.

Oval Iron.

⅝ to 1⅛	.40 extra.
¾ to 13-16	.50 "
⅞ to 11-16	.60 "
¼ to 9-16	.80 "
⅜ to 7-16	1.10 "
¼ to 9-16 x 3-16	1.00 "
⅜ to 11-16 x ¼	1.20 "

Half Oval and Half Round.

2¼ to 3	.60 extra
⅞ to 2	.50 "
¾ to 13-16	.70 "
⅞ to 11-16	.90 "
¼ to 9-16	1.30 "
⅜ to 7-16	2.50 "
5-16	3.50 "
¼	4.50 "

Half Ovals less than ¼ their width in thickness, extra price.

Horse Shoe Iron.

All sizes 1 c. extra.

Cutting ordinary bars to specified length, .20 to .30 extra, according to length and size.

Steel Bands.

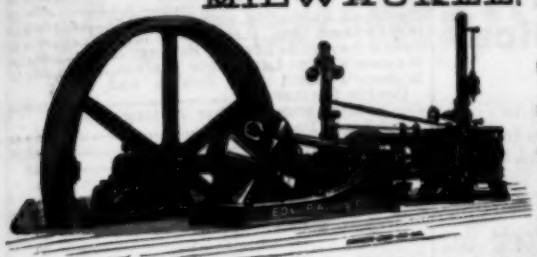
Width In Inches.	English Standard Gauge.		
1 1-2 to 6,	Nos. 7, 8, 9 or 3-16"	1.50	Base.
		Extras.	
1½ to 6,	" 10, 11, 12 or 1/4"	.05 per 100 lbs.	
1 to 1¾,	" 7, 8, 9 or 3-16"	.10	"
1 to 1¾,	" 10, 11, 12 or ¼"	.15	"
13-16 and ⅞,	" 7, 8, 9 or 3-16"	.20	"
13-16 and ⅞,	" 10, 11, 12 or ¼"	.25	"
11-16 and ¾,	" 7, 8, 9 or 3-16"	.30	"
11-16 and ¾,	" 10, 11, 12 or ¼"	.35	"
9-16 and ⅝,	" 7, 8, 9 or 3-16"	.40	"
9-16 and ⅝,	" 10, 11, 12 or ¼"	.45	"
½,	Nos. 7, 8, 9 or 3-16"	.55	"
½,	" 10, 11, 12 or ¼"	.60	"
7-16	" 7, 8, 9 or 3-16"	.75	"
7-19	" 10, 11, 12 or ¼"	.85	"
⅜,	" 7, 8, 9 or 3-16"	.95	"
⅜,	" 10, 11, 12 or ¼"	1.05	"

Iron and Steel Hoops.

Width Inches.	English Standard Gauge.		
7-16 to 3	Nos. 13, 14, 15 and 16	1.60	Base
		Extras.	
7-16 to 2,	" 17, 18, and 19	.05 per 100 lb	
7-16 to 2,	" 20	.10	"
7-16 to 2,	" 21	.15	"
7-16 to 1¾,	" 22	.25	"
¼ to 1¾,	" 13, 14 and 15	.05	"
¼ to 1¾,	" 16, 17 and 18	.10	"

THE EDWARD P. ALLIS COMPANY

MILWAUKEE, WIS.



MANUFACTURERS OF

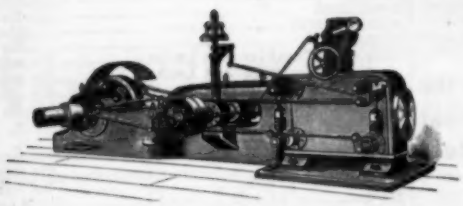
Blowing Engines, Hoisting Engines, Pumping Engines Air Compressors, Special Engines for Electric Lighting Street Railways and Rolling Mills. Ore Crushers, Crushing Rolls, Stamp Mills Concentrators, General Mining Milling and Smelting Machinery.

Reynolds Corliss Engines.

NEW YORK. CHICAGO. MINNEAPOLIS. DENVER. BUTTE. CITY OF MEXICO. SAN FRANCISCO. PITTSBURG

THE LANE & BODLEY CO.,

CINCINNATI, OHIO.



Engines,

ALL SIZES.

Simple and Compound.

Shafting, Hangers, Pulleys.

Belt Elevators, Saw Mills.

The Geo. B. Sennett Co., Youngstown, Ohio,

MANUFACTURERS OF

Sennett Compression Coupling

And Other Specialties.

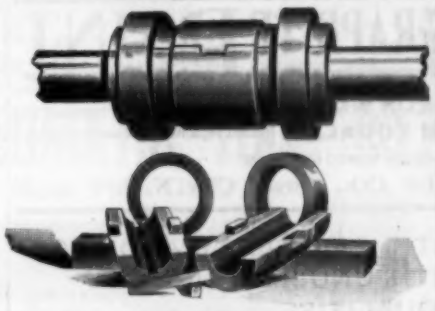
We do not claim novelty in these Couplings so much as good material, good workmanship and extreme simplicity. We make them of a very strong cast iron, with wrought iron bands.

We make also the

SENNETT ENGINE

20 to 40 H. P.

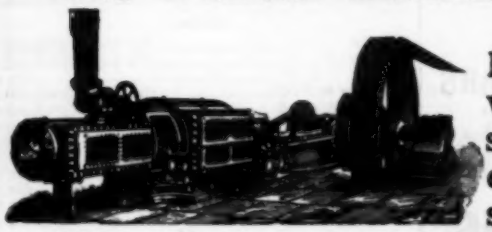
Foundry contracts solicited for duplicate castings, from 10 lbs. to 5 tons each.



WILLIAM TOD & CO.

YOUNGSTOWN, OHIO.

The Porter-Hamilton Engine



Reversing Engines, Blowing Engines, Converters, Hydraulic and special heavy machinery for the iron and steel trades.

Williams Improved Vertical Engines

For Direct Electrical and all High Class Work.

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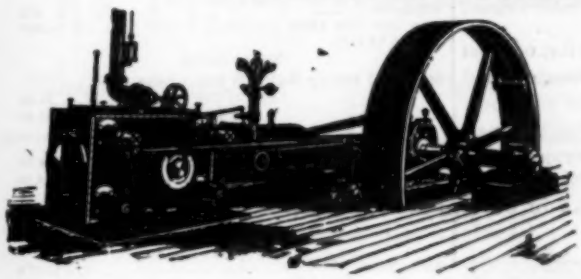
Park Building, Pittsburg, SEWARD S. BABBITT.

....The Rarig Engineering Company.

COLUMBUS, OHIO,



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Heavy Duty Corliss

BLOWING - STATIONARY HAULAGE - HOISTING - Engines.

Boilers, Tanks, Steel Chimneys Structural Iron Work.

1⅝ to 1¾,	"	19 and 20	per 100 lbs.
1⅝ to 1¾,	"	21	.20 "
1⅝ to 1¾,	"	22	.30 "
15-16 and 1,	"	13, 14 and 15	.10 "
15-16 and 1,	"	16, 17 and 18	.15 "
15-16 and 1,	"	19 and 20	.20 "
15-16 and 1,	"	21	.25 "
15-16 and 1,	"	22	.35 "
⅞,	Nos. 13, 14 and 15		.30 "
⅞,	" 16, 17 and 18		.25 "
⅞,	" 19 and 20		.30 "
⅞,	" 21		.35 "
⅞,	" 22		.45 "
⅞ and 13-16	Nos. 13, 14 and 15		.30 "
⅞ and 13-16	" 16, 17 and 18		.35 "
⅞ and 13-16	" 19 and 20		.40 "
⅞ and 13-16	" 21		.45 "
⅞ and 13-16	" 22		.50 "
⅞ and 13-16	" 23		.60 "
11-16,	Nos. 13, 14 and 15		.35 "
11-16,	" 16, 17 and 18		.40 "
11-16,	" 19 and 20		.50 "
11-16,	" 21		.60 "
11-16,	" 22		.70 "
11-16,	" 23		.80 "
¾,	Nos. 13, 14 and 15		.40 "
¾,	" 16, 17 and 18		.45 "
¾,	" 19 and 20		.55 "
¾,	" 21		.65 "
¾,	" 22		.75 "
¾,	" 23		.85 "
9-16,	" 13, 14 and 15		.45 "
9-16,	" 16, 17 and 18		.50 "
9-16,	" 19 and 20		.60 "
9-16,	" 21		.70 "
9-16,	" 22		.80 "
9-16,	" 23		.90 "
⅝,	" 13, 14 and 15		.55 "
⅝,	" 16, 17 and 18		.60 "
⅝,	" 19 and 20		.70 "
⅝,	" 21		.80 "
⅝,	" 22		.90 "
⅝,	" 23		1.00 "
7-16,	" 13, 14 and 15		.80 "
7-16,	" 16, 17 and 18		.90 "
7-16,	" 19 and 20		1.00 "
½,	" 13, 14 and 15		1.00 "
½,	" 16, 17 and 18		1.10 "
½,	" 19 and 20		1.20 "

Sheet Iron.

No. 10	1 50
No. 12	1 70
No. 14	1 60
No. 15-17	1 75
No. 18	1 85
No. 20	2 00
No. 22-24	2
No. 25-26	2 20
No. 27	2 30

English Tool Steel.

Jessop's	15¼c
Hobson's "Best"	15½c
" "Choice"	35c

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 35
Shell	1 45
Flange	1 55
Marine Flange	1 60
Fire Box	2 05

Above includes plates 90 inches wide.

90 to 96 in. wide	¼c. lb. extra
96 to 100 in. wide	1c. "
100 to 104 in. wide	1¼c. "
104 to 106 in. wide	special.

Flats.	cts. lbs.
2 to 9-16 in. wide by 2 to ⅝ thick	.08

Bessemer and O. H. Steel.

Bessemer Machinery	base price,	1 40
Open-hearth Tire	"	1 45
Open-hearth Spring	"	1 80
Sleigh Shoe	"	1 45
Toe Calk	"	1 90
Cutter Shoes, tapered and bent	"	1 60

American Cast Tool Steel.

ROUND, SQUARE, AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	.08
9-16 to ⅝ in. "	.08
7-16 to ⅜ and 2⅝ to 3 in.	.09
3⅛ to 4 in.	.09½
⅝ to 11-16 and 4⅛	.10
⅝ to 6 in.	10½
¾ to 9-32 and 6⅝ to 7 in	.11
1 in.	13

Burden Boiler Rivets.

⅜, ½, 11-16 and ⅝ inches diameter	3 00
Bridge ⅜, ½, 11-16 and ⅝ inch diam.	3 55

Wrought Pipe and Boiler Tubes.

Lap weld black, base, and 10 per cent.	.78
Butt " " " "	.73
Lap " galv. " "	.70
Butt " " " "	.67
Boiler tubes 2½" and smaller	.72½
Boiler tubes 2½" and larger	.72
Casing screw and socket joint	dis. 50
Casing inserted joint	dis. 45

MACHINERY SUPPLY MARKET.

[From Store, Cleveland.]

Anti-Friction Metals.

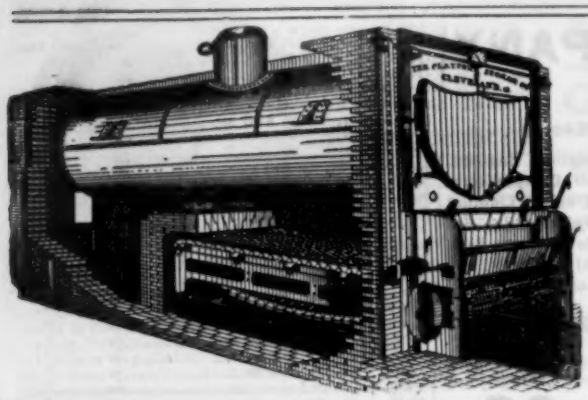
Magnolia Anti-Friction Metal, 25 cts. per lb. f. o. b. New York or Chicago.
No Name Metal, 15 cts. per lb., f. o. b. New York or Chicago.
Mystic Metal. 10 cts. per lb., f. o. b. New York o Chicago.

Anvils.

American	₩ lb 9@11
Wright's	₩ lb 12

Bellows.

Blacksmiths'	Hill's	dis
	Bullock's	dis 50&10
Moulders'		dis 40@40&10
Hand		dis 40@10@40



The Playford Mechanical Stoker

Guaranteed to

Abolish smoke, to increase boiler capacity and to save fuel.

For information, address,

The Playford Stoker Co.,

404 Telephone Bldg.,

CLEVELAND, O.

IRON CLAD PAINT CO.

Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g,

CLEVELAND, OHIO.

ORDER DIRECT FROM THE

Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.

DIXON'S SILICA GRAPHITE PAINT

FOR TIN OR SHINGLE ROOFS AND IRON WORK. IT IS ABSOLUTELY WITHOUT AN EQUAL.

Tin roofs well painted have not required repainting for 10 to 15 years.

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Iron and Steel Directory

Published by The American Iron and Steel Association.

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Is a thorough revision of the list of blast furnaces, rolling mills, Bessemer and Open-Hearth steel works, plate and sheet mills, nail mills, tin plate mills, malleable, cast iron pipe and wrought pipe works, car wheel and locomotive works, with many new lists of works in other lines.

Belting.

Boston Belting Co.'s standard	dis 70 & 10
" " " extra	dis 60&10
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 50
Shults Raw Hide Leather Belting, single	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shults Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.	dis 35

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 80
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 33⅓
Horton's Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 45
Sweetland "	dis 40
Almond Drill	dis 40
Morse "	dis 20
Skinner's Combination Lathe	dis 40&15
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 30

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 10 to 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	₩ 3½
Iron, steel points	₩ lb 1

Drill and Drill Sockets.

Twist Drills	
Morse Taper & Straight Shank to 1½"	dis 50 & 10 to 60
Morse Taper and Straight Shank Larger than 1½"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 60@60&5
Cleveland " "	dis 60@60&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150 gr.	Flour, C. F
Kegs, ₩ lb	4½c	5 c	2½c
½ kegs ₩ lb	4½c	5½c	2½c
¼ kegs ₩ lb	5 c	5½c	3 c
10 lb cans, 10 in case	6 c	6½c	c
10 lb cans less than 10	10 c	10 c	½c

Emery Cloth and Paper.

Barder, Adamson & Co.	dis 50@50&5
H. H. Barton	dis 50@50&5

Emery Wheels.

Detroit	dis 60@70
Norton's	dis 60@70
Crant	dis 60@70
Sterling	dis 60@70
Celluloid	dis 10&33⅓
Northampton	dis 50
Crystal	dis 65@70
Vitrified	dis 60@70
Vulcanite	dis 60&10
Hamden	dis 60&10@70
Cyclone	dis 60@60&10

Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F.	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70
Western	dis 70
Stub's	dis 2
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 55
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs.	10c
" " " " over 5 lbs.	8c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¼	4	3½	3⅛
Hexagon	15⅝	11⅝	8⅝	6	5¾	5¼	
Washers	9	8	7	5	4½	4⅛	4⅛

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Car lots $1.30

Less than car lots $1.40

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Zinc and Tin	dis 60
Brass and Copper	dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.	dis 10@10&15

Picks.

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" 6 to 7 lbs	dis $13 60

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Rivets.

Iron, Thousand, list November 1, 1894	dis 60@60
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894	dis 60@65
Copper	dis 50@50&15

Taps.

Cards, Hand and Nut to 2 in.	ds 50
Carpenters' " " "	dis 50
Morse " " "	dis 50
Pratt & Whitney " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in.	dis 70
Stay Bolt Taps	dis 25
Stove Bolt Taps	dis 55
Pulley Taps	dis 40

Vises.

Solid Box	dis 60
Parker's	dis 20@25
Prentiss	dis 20
Stephen's	dis 25@30
Barrett's	dis 30
Miller's Falls	dis 40
Merrill's	dis 15@20
Howard	dis 35

Wire.

List, Apr. 9, 1894

Brass	dis 35c
Copper	dis 35c
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75&5
" " Nos. 27@36	dis 75&10&5
Coppered Nos. 0 to 18, market list	dis 70@70&5
Galvanized Nos. 0 to 18 " "	dis 65&5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
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Annealed Grape, Nos. 10 to 14	dis 75
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15	13	11	Lorain Branch	12	14	16
P.M.	P.M.	A.M.	LV. AR.	A.M.	A.M.	P.M.
4:25	2:25	6:27	Lorain	9:15	11:35	7:30
4:40	2:30	6:44	Elyria.....	9:00	11:21	7:16
4:56	2:55	7:04	Grafton	8:43	11:07	6:58
5:15	3:12	7:23	Lester.....	8:25	10:50	6:40
5	3	1	Main Line	2	4	6
5:30	2:25	7:20	Cleveland	8:30	11:50	7:15
5:47	2:41	7:36	Brooklyn	8:14	11:34	7:01
6:42	3:26	8:22	Lester.....	7:29	10:49	6:19
6:52	3:35	8:30	Medina	7:16	10:37	6:07
7:05	3:46	8:41	Chippewa La	7:04	10:26	5:55
7:20	4:01	8:56	Sterling.....	6:48	10:12	5:40
8:09	4:46	9:45	Massillon	6:00	9:23	4:54
8:55	5:31	10:34	Canal Dover.	5:11	8:36	4:10
9:02	5:38	10:41	New Philade	5:04	8:28	4:03
9:20	6:05	11:25	Uhrichsville	4:45	8:10	3:45
.....	8:10	1:30	Bridgeport ...	.....	6:05	1:40
.....	8:25	.....	Bellaire.....	.....	5:50	.....
P.M.	P.M.	P.M.	AR. LV.	A.M.	A.M.	P.M.

No. 9 leaves Lorain 9:50 a.m., Elyria 10:05, Grafton 10:21; arrives Lester Junction 10:40. No. 10 leaves Lester Junction 3:25 p.m., Grafton 3:42, Elyria 3:57; arrive Lorain at 4:10 p.m.

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Akron, Canton & Chicago	*6 05 A M	*6:35 P M
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The American Iron and Steel Association has just completed a thorough revision of its Directory to the Iron and Steel Works of the United States, bringing down to April, 1898, a description of these works. It also contains a complete Directory to many leading industries which are large consumers of iron and steel. This edition, which is the fourteenth that has been issued, embraces more complete details of all the iron and steel works of the United States, and of industries which are large consumers of iron and steel, than any preceding edition. It retains all the old features of preceding editions and contains many new features.

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Stamping Works,
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Wrought Iron, Wrought Steel and Riveted Pipe Works,
Seamless Tube Works,
Chain Works,
Bolt, Nut and Rivet Works,
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ALSO A LIST OF THE

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This edition of the Directory is an invaluable book of reference for all business men who wish to correspond with iron and steel manufacturers or with iron and steel consumers, forming, in every respect, a COMPLETE GUIDE to the iron and steel works of this country and to the principal works which consume iron and steel.

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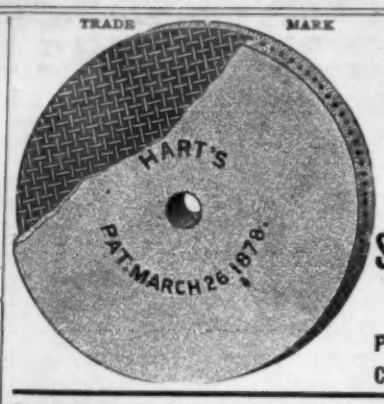

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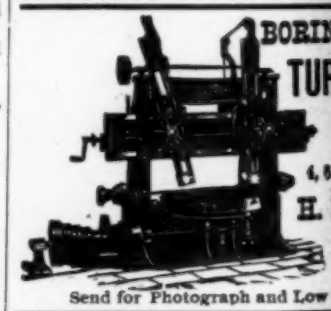

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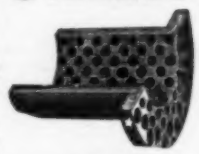

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